...; FEBRUARY 10, 1938 FIRST AERO WEEKLY IN THE WORLD ENTD. AT THE G.P.O. AS A NEWSPAPER

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1520 XXIII

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Self-Government

BOTH Sir James Ross, First Deputy-Secretary of the Air Ministry, and Mr. Handley Page referred, at the first annual dinner of the A.R.B., to the measure of "self-government" which has been introduced by the establishment of the Air Registration Board, to take over the work previously done by the Air Ministry in the matter of inspection and supervision of aircraft up to the ten-passenger size.

The expression is apt, for while authority is vested in a Government department there is ever the tendency to lay any blame on that department and to disclaim responsibility by saying that everything was done in accordance with the rules laid down by the department. Self-government implies responsibilities no less than privileges, and it will be up to the A.R.B. to demonstrate that it is, as Mr. Handley Page put it, "grown up and can look after itself."

From the fact that there are represented on the A.R.B. the three interests chiefly concerned, the constructors, the operators and the underwriters, it is legitimate to hope that the A.R.B. will be a success. It is too early yet to express an opinion, beyond saying that already there is a noticeable speeding up, more particularly in the direction of getting a decision on some doubtful point. That is all to the good, and is due partly to the Board's aim, as expressed by Sir Maurice Denny, to reduce regulations to a wise minimum, and partly to the willingness of the secretary, Mr. Thomas, to give decisions, in certain cases, on his own responsibility. In an old-established Government department speed is difficult to achieve. The late Sir Sefton Brancker was often able to give a decision at very short notice, but he was a very exceptional man, and not afraid of cutting through miles of red tape if the object justified such action.

In the end the success or otherwise of the A.R.B. will depend very largely on the underwriters, and Mr. Graham Mackinnon uttered a timely word of warning when he pleaded for bearing in mind the equivalent of Martlesham. Stability, controllability and good view are very important points. But a Martlesham equivalent costs money. Will the Air Ministry's "four-fifths" cover it?

The Army's Air Arm

THERE were indications last week that the War Office was beginning to stir in the direction of demanding full control of its own air arm, as the Admiralty has succeeded in securing full control of the Fleet Air Arm. On Tuesday the existence of such a demand was denied by Mr. Hore-Belisha. In any case, it did not appear that there was any offer to hand over to the Air Ministry the ground elements of air defence, namely, the guns and searchlights of the Territorial Army which operate under the command of the Air Officer Commanding-in-Chief the Fighter Command.

The ideal arrangement of defence is that each of the fighting Services should have full control of all the arms which contribute to the efficient carrying out of its proper functions. For one Service to borrow troops and arms from another has never worked well, and for that reason the Admiralty raises and maintains its own soldiers, the Royal Marines, instead of borrowing them from the Army. The Royal Air Force likewise raises and maintains its own companies of armoured cars in Iraq and Transjordan. It is not, however, always expedient to aim straightway at the ideal. Sometimes it is better to temporise, compromise, and work by degrees towards the ideal. Just as it is obviously impracticable for the Air Ministry to take over the anti-aircraft Territorials at the present moment, so it is by no means certain that this is the time to hand over to the War Office full control of the air squadron which it would need if it were to do its job in war.

Overlooked

TO the outside observer it appears that since the Armistice the War Office has given far too little thought to the question of the air. Its attention has been concentrated almost entirely on the problems of mechanisation, and one cannot say that this preoccupation was wrong. The War Office has been content to accept the small number of co-operation squadrons which the Air Ministry has placed at its disposal, and when manœuvres were held it has borrowed a few squadrons of

fighters and bombers "for the duration." It has not even seemed very keen to have Army officers trained as air pilots, and when the number was increased a few years ago the initiative came from the Air Ministry.

The seriousness of the situation is this. If war broke out and the Army had to move overseas, as in 1914, it would, of course, take with it the army co-operation squadrons which have been trained to work with it. Leaving aside for the moment the question of whether there are enough of these squadrons for the Army's needs, it is quite certain that co-operation squadrons would not be able to do all the classes of air work which the Army would require. They are merely reconnaissance squadrons —eyes in the air. They are not prepared to carry out ground attacks on troops, which they regard as the function of fighter squadrons, and their powers as bombers are not extensive. To use them as fighters or bombers would, in fact, run the risk of depriving the Army of reconnaissance, which is quite vital. It would seem that the War Office hopes that the Air Ministry will lend it some squadrons of fighters and bombers as it has always done for manœuvres. But is that hope well founded? If heavy air attacks were being made by the enemy on Great Britain, it is unthinkable that the Fighter Command or the Bomber Command would agree to part with any of their squadrons. The prospect of such a refusal would create a very serious situation, and might result in the Army's defeat. Until such an impasse has been made impossible we cannot say that our defences are in a healthy condition.

Optimum Altitude

SOME of the fantastic theories which have been advanced on the subject of sub-stratosphere flying are ably exploded by a contributor to our American contemporary, *Western Flying*. He suggests that 20,000ft. will be the most advantageous height for some time to come and quotes as an instance of how *little* operating speed may be raised by increasing height figures for the new Boeing 307-S four-engined transport under construction for Pan-American Airways, which, according to estimates, will be capable of 269 m.p.h. at 25,000ft., using 75 per cent. power. It has been calculated that at 30,000ft., with the engines at full throttle, a gain of only 1.67 m.p.h. would be obtained, and, to quote the author, "to get any more than that 1.67 m.p.h. would require engine gadgets much too costly for any sustained flight operation, at least for some years to come."

Discoursing on the benefit to be derived from the "thin air" at great altitudes, the writer explains that at 20,000ft. more than half this benefit is obtained, but, he proceeds, "to get just 25 per cent. more of that stratosphere benefit planes would have to go clear up to 40,000ft."

To put it more simply, by climbing 20,000ft. higher (which would be much harder) would do only half as much good as the first 20,000.

The precise advantages conferred by operation around the 20,000ft. level will soon be demonstrated by "Pan-Ams.'" first pair of 307-Ss, which, like many another useful development in commercial flying, are largely the outcome of research conducted by that company's brilliant technical staff.

Nor is Pan-American alone in its contention that 20,000ft. is the present optimum height for continuous commercial operation, for Transcontinental and Western Air, which is pursuing a programme of intensive high-altitude flying, is said to concur.

Getting the Load Across

IT has now become possible to reveal the fact that the eight flying boats ordered by Imperial Airways from Short Brothers will be specially strengthened in order that their maximum permissible gross weight may be increased from the 45,000 lb. of the two long-range boats *Caledonia* and *Cambria* to some 52,000-53,000 lb. The two older boats have but little pay load over and above the fuel for the westward Atlantic flight. If they are to carry a reasonable pay load, their gross weight will have to be increased. It is thought, from the take-off tests made at 45,000 lb., that the boats will be able to get off under their own power at 50,000 lb. gross weight at least, and probably more. As the addition contemplated is 8,000 lb., there should be a sufficient margin for structural strengthening, still leaving some 5,000 lb. for pay load.

Whatever success may ultimately be achieved by the Short-Mayo composite aircraft, the existing upper component, *Mercury*, is designed for a pay load of 1,000 lb. only, and if the eight Short boats can get off under their own power with a pay load of 5,000 lb. or so, an experimental Atlantic mail service may be a possibility towards the end of the coming summer.

Refuelling in the air is another form of "assisted take-off" which comes into the picture in this connection. Sir Alan Cobham has been working on the problems for many months, and recently a successful refuelling flight was made (see *Flight* of January 27, 1938). The system is similar to that developed at Farnborough, and, provided thick weather does not prevent contact being made, the technical problems appear to be fairly well solved.

At any rate, Imperial Airways may be congratulated on looking ahead and getting ready to take advantage of any development likely to be made in the near future.

Easier Approach

THE technique of the flapped approach must of necessity develop parallel with increasing performance, and various attempts are being made abroad to facilitate the landing characteristics of heavily loaded high-speed monoplanes. One of the most practical of these seems to have been made in the new Junkers Ju.90 four-engined transport, which may be regarded as Germany's "Ensign." Not only is this huge machine provided with the latest version of the familiar Junkers "double-wing" arrangement, but it is fitted, in addition, with an auxiliary split flap. This combination, according to Junkers technicians, offers the following advantages: On the approach the "double-wing" flaps are lowered to the fullest extent, the machine then being set at a good gliding angle. On crossing the boundary the pilot also opens the split flap, the increased braking action of which makes the glide even steeper. The system has proved particularly effective for blind landing, the split flap then not being opened until the machine passes over the main beacon or receives the ZZ signal.

In America the Seversky concern is using a three-piece flap, the centre part being of the split type whereas the outboard units are really sections of the trailing edge. Though the outer panels may be operated independently of the centre panel, combined operation is available for landing, the outboard sections being lowered automatically before the central portion at what is described by the manufacturers as "the most efficient interval." Take-off and climb are benefited by judicious use of the outer sections, the central portion, of course, being intended solely as a landing "discelerator."

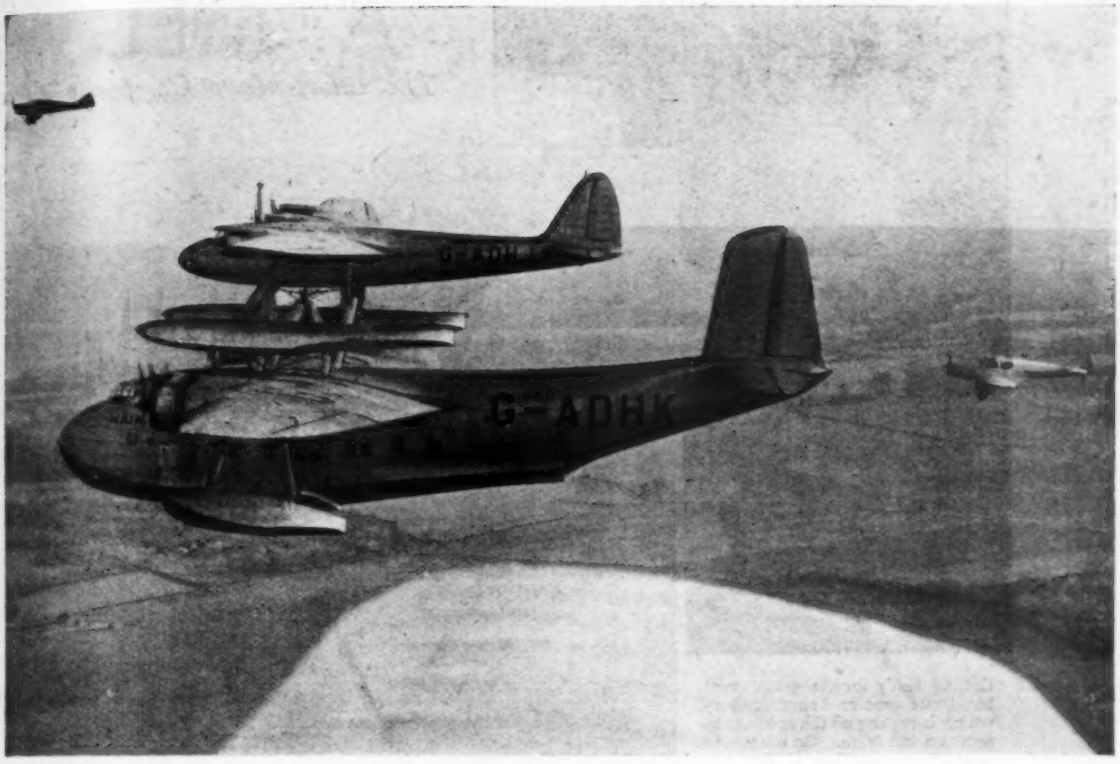
It does seem, judging from results obtained with the Junkers and Seversky flap systems, that a welcome improvement can be obtained in the landing characteristics of a typical monoplane by the increased application of proven technique.

Where the Seaplane Scores

A FEW weeks ago comment was made in *Flight* on the incident when an Imperial Airways flying boat returning to Southampton found fog over the landing place off Hythe, and accordingly alighted on the water outside the murky area and taxied up Southampton Water. A landplane in similar circumstances would not have been able to get its passengers to their destination.

Now another instance of the advantage of the seaplane comes to hand. When Signor Mario Stoppani was forced to put his machine on the water 120 miles off the coast of

DIARY OF FORTHCOMING EVENTS—PAGE 146



UP WITH THE COMPOSITE : Though the first separation of the Short-Mayo composite combination, *Mercury* and *Maia*, is said to have been witnessed only by bargees in the Medway estuary, the art of the aerial photographer brings us an intimate glimpse of this strangest of all aircraft not long before the "great event." A report of the separation appears overleaf.

Brazil, a D.L.H. seaplane was able to alight beside him and take him on board. The lesson is not invalidated by the fact that the seaplane could not take off again. It remained afloat until the mother ship, *Schwabenland*, steamed up and took the seaplane on board. Had it been a landplane which discovered the Italian airman beside his burning machine it could only have circled round overhead and watched him drown.

These incidents have a distinct bearing on the modern tendency to say that when flying over water it does not matter, from the point of view of safety, whether one uses a landplane or a seaplane, and that it is only the facilities at the terminal points which matter. It is true enough that if a flying boat were forced down in a heavy sea it probably would not float for long, and in any case forced landings are now very uncommon—though Signor Stoppani was forced down. But other things beside engine failure may cause a forced landing. Seas are not always rough, and the ability to float for a considerable period may give just time for a rescue. For that reason it will be a good thing when Qantas Airways exchanges its present landplanes for C Class flying boats on the route between Singapore and Sydney. *Carpentaria* has been finished, and *Corio* is ready for delivery.. The shark-infested Timor Sea has not yet claimed a landplane victim, but it would not be wise to trust it longer than is necessary.

The Singapore Exercises

IN all martial exercises, and particularly in combined exercises by all three Services, it is very necessary to sound a warning against the tendency to ask which side won. Occasionally, of course, large-scale manœuvres may be staged in which a free hand is given to the commanders on each side with the object of testing to some extent the tactical ability of Generals, Admirals or Air Marshals, but such occasions are rare. Usually, coast defence exercises or air exercises are simply intended to "run the engine up" and see if all the parts are functioning with efficiency. That, undoubtedly, was the main object of the recent sham attack on Singapore.

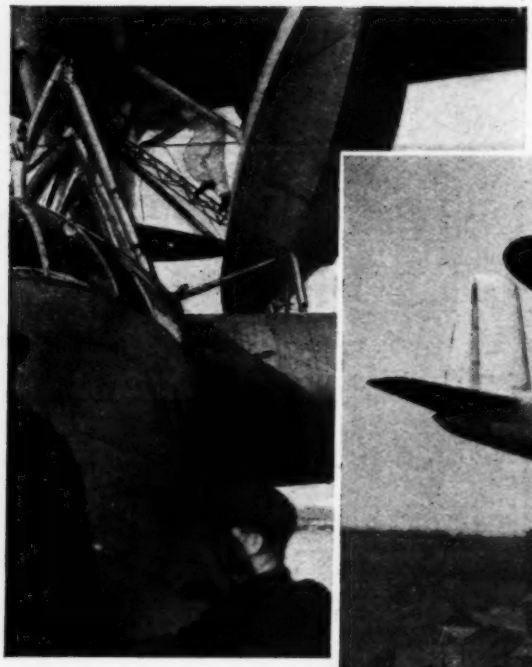
This great new fortress has been years in building at a cost of several million pounds. It would have been completed earlier had not a Socialist Government, in a fervour of pacifism, stopped all work on it while it was in power. But at last the main fortifications have been completed, and it was certainly desirable to hold some exercises which would bring all the elements of the defence into action, familiarise each element with the part it would have to play in real war, and to see if any gaping holes in the scheme could be discovered. Nothing but real war could prove whether Singapore is impregnable or not. A huge fortress is not like a specimen aeroplane wing, and it is not feasible to test it to destruction. But much is gained if the three regular Services and the local Volunteers and Volunteer Air Force are trained to work together, and to understand something of the powers and limitations of their comrades in arms. It is especially desirable that naval, military and air staffs should learn to work together in harmony, and this can only be practised in peace-time exercises. It might be fatal to enter on a war without such experience.

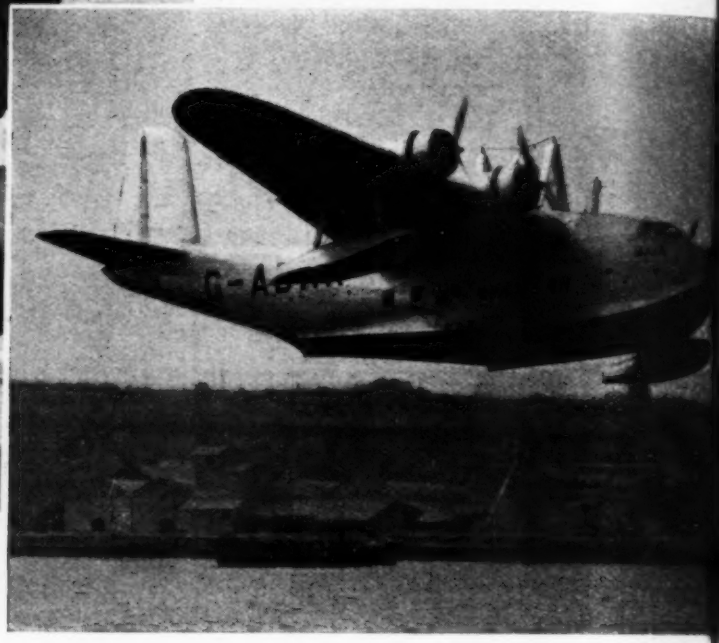
At the same time these exercises at Singapore had a political object, and must have had a useful political result. Singapore can never be regarded as a threat to Japan, for it is too far away. Even if war were to break out between Britain and Japan, a fleet based on Singapore could not menace Japanese waters. But while the Far East is in its present deplorable state of bloodshed and aggression, it is certainly wise to remind all and sundry that Britain is a great power in the Indian Ocean, and that Australia, with its huge expanse and sparse population, is not outside the reach of the long arms of the Royal Navy and the Royal Air Force. These exercises preceded the visit of American warships to Singapore, and that visit, too, is not without its political significance.

A MEDWA

The Short-Mayo Composite Aircraft O

(Illustrated





Getting ready for the great event. Mr. Piper goes on board *Mercury*, which is resting on the special supports on the *Maia*. On the right is seen *Maia* returning to her base at Rochester.

AFTER months of delays, which gave the sceptics a fine opportunity to shrug their shoulders, the Short-Mayo composite aircraft made its first separation over the mouth of the Medway last Sunday. Mr. J. Lankester Parker, who has been in charge of the lower component throughout the tests, and Mr. H. L. Piper, who has flown the upper component as a separate aircraft and been a "passenger" in it during the combined flights, were at the controls of *Maia* and *Mercury* respectively.

On previous flights there had been a certain amount of difficulty with the telephone which connects the two cockpits; and the contacts which are intended to show, by means of lights in the two cockpits, the trim of the upper component, had been too insensitively adjusted, so that they indicated perfect trim at all speeds and attitudes. This, as Euclid would have said, was obviously absurd, and in the circumstances no separation was attempted. A slight adjustment of the contact points was made, and on Saturday of last week a short flight was made. The telephone worked, and the contact lights winked on and off as they were intended to do, but the air was extremely bumpy; again the attempt was abandoned after a short trial flight.

Then on Sunday conditions seemed to be favourable. High tide occurred in the late afternoon, the wind was not very strong, and the air promised an absence of bumps. Parker and Piper took their places and the combination outfit took the air in its usual troublefree way, with the upper component loaded to the maximum weight at which it can alight on its own floats without jettisoning fuel, i.e., about 14,500 lb.

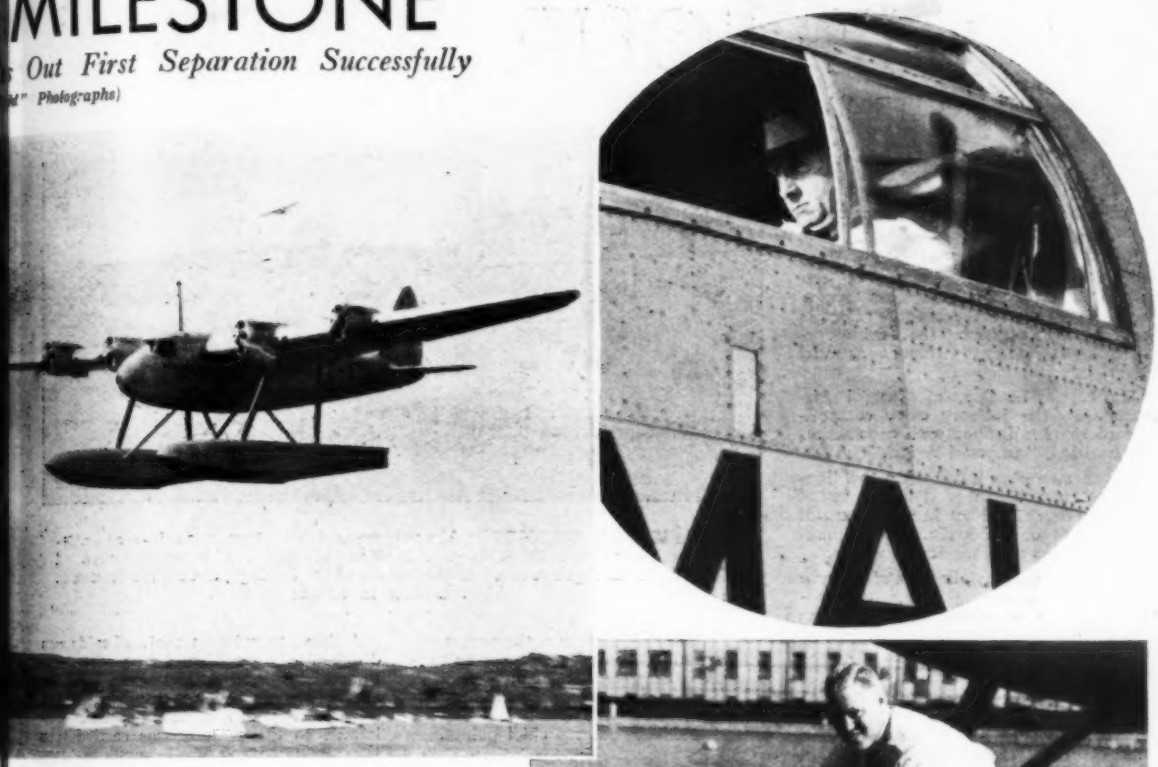
At a height of only 700ft. the pilots talked it over on their telephone and decided that conditions were not likely to become much better for a long time. Setting *Maia* at a steady 110 knots, the hook releases were pulled, first one, then the other and finally the third, auto-

The composite aircraft taxying into position for a take-off with all eight engines running.

A MILESTONE

Aircraft Out First Separation Successfully

(Illustrated Photographs)



After the successful separation Mr. Piper gave a fine demonstration of high-speed flying before alighting off the Short works at Rochester. On the right he is seen mooring *Mercury*. Mr. Lankester Parker, who piloted *Maia*, inspects his "clocks" in the inset picture.

matically operated by the excess lift of *Mercury*, and the hook came out with a loud click. Parker felt as if he had dropped a heavy bomb. Piper had to be quick with his controls to prevent over-climbing and yet avoid a dive which might bring him dangerously close to *Maia*. For a few seconds the two pilots could not see one another; then they were clear, and Parker returned to his moorings while Piper gave a fine display of fast flying until his turn came to tie up to his buoy.

And so ended a great experiment, carried out without any fuss or excitement.

Final Tests

The next step in the thorough testing of the composite will be to fly it with ever-increasing loads of petrol on board, until the *Mercury* is up to its full C. of A. take-off weight of 21,000 lb. It will be appreciated that these tests will take some considerable time, as it will be necessary for Mr. Piper to fly around while jettisoning fuel after the separation. It is rather staggering to think of all that good petrol being wasted, but the tank system is not such that water can be substituted as ballast.

Press photographers in aeroplanes have been something of a pest to Parker and Piper during the preliminary tests. When Piper is dumping fuel, it would be well for them to keep out of the sky. In any case he will probably do so well out over the sea in order to give the petrol a chance to disperse without causing risk to anyone.

"A somewhat 'dirty' biplane" is the impression of the composite aircraft when flying, due mainly to the presence of the floats of the upper component.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

EMPIRE Air Day this year, which will gain greatly in importance as a result of the discontinuance of the Royal Air Force Display, takes place on Saturday, May 28.

In connection with Empire Air Day, the sponsors, the Air League of the British Empire, invite designs for a poster to advertise the event. Details are obtainable from the Secretary-General, at Maxwell House, Arundel Street, London, W.C.2.

Mr. L. Castlemaine, of General Aircraft, wins the January essay competition of the Air League with a contribution entitled, "Imperial Vision."

Eleven men were killed when two Consolidated patrol-bomber flying boats of the U.S. Navy collided in a rain squall off San Diego, California. Three hundred machines searched for survivors.

One of the first installations of the new Ranger inverted-vee 450 h.p. engine—the American counterpart of our own Gipsy Twelve—is in the new Fairchild 46—a five-seater with a cruising speed of 205 m.p.h.

Engines imported into Holland numbered 186 (£207,263) in 1937, as against 97 (£110,005) in the previous period. The greatest total—87—came from America, but Britain was a close second with 84.

Signor Stoppani, who was rescued from the South Atlantic by a Luft Hansa flying boat, received serious burns through the igniting of petrol he had released to calm the sea. His two companions lost their lives.

The newest Bellanca production is the Junior, a cantilever low-wing monoplane three-seater capable of up to 130 m.p.h. on only 90 h.p. As an alternative to the 90 h.p. Le Blond the 75 h.p. model may be installed. Retractable or fixed undercarriage may be specified.

FLEET FIGHTER PROTOTYPE: The new experimental Grumman mid-wing single-seater fleet fighter for the U.S. Navy. A Pratt and Whitney Twin Wasp engine is fitted and the undercarriage retracts into the bottom of the fuselage, as with the Grumman biplanes now in service.

Mr. William Courtenay, the aeronautical journalist, has been adopted as prospective Conservative candidate for Limehouse. He will oppose Major Attlee, M.P., and will make rearmament and air raid defence his chief points.

The latest Hamilton Standard development is the Hydromatic full-feathering constant-speed airscrew. Complete feathering of the blades prevents windmilling in the event of engine failure and offers a wider pitch range than is available with the standard c.s. type.

At the annual meeting of the Civil Aviation Section of the London Chamber of Commerce last week, Lt.-Gen. Sir George Macdonogh, G.B.E., K.C.B., K.C.M.G., was re-elected chairman for 1938, whilst A.V.-M. A. E. Borton, C.B., C.M.G., D.S.O., A.F.C., and Lord Greenway were re-elected deputy chairmen.

A sleeve target on 1,200ft. of cable was dropped by a machine of a squadron stationed near Prague, and while lying on the aerodrome became entangled in the undercarriage of a second machine. Unknown to the pilot it was carried into the air, wrapping itself round the legs of a small boy, who was hoisted into a tree. The victim is said to have been little the worse for his experience.

Twenty-five Years Ago

(From "Flight," February 8, 1913.)

From the Report of the Departmental Committee on Accidents to Monoplanes.

"From the point of view of national defence, we should have considered it as being something almost akin to a national calamity if a type had been condemned which we know to be doing satisfactory service in the hands of the flying corps of other countries. In France, particularly, the monoplane is regarded as an absolutely essential type for services which cannot be so readily performed by the biplane. It is quite obvious that an air-fleet consisting entirely of comparatively slow-travelling biplanes must be at an initial disadvantage compared with one which includes a high percentage of very fast and manœuvrable monoplanes."

COMFORTABLY TO KENYA: As recorded on page 131, Capt. G. de Havilland and Mr. F. T. Hearle (left) have delivered a Wilson Airways Dragon Rapide by easy stages to Kenya. Mr. Hearle has been a colleague of "D.H." since 1908, when he helped him build his first machine.

Thirteen of the crew of eighteen of the U.S.S.R. V.6, the largest Russian airship, lost their lives when, it is believed, the ship hit a mountain a few days ago near Kandalaksha, due to bad visibility. The V.6 was on a training flight from Moscow as a preliminary to a relief flight to the Papanin polar expedition. Last year the V.6 beat the record of the *Graf Zeppelin* by remaining in the air for 130 hours.

VISIT of FRENCH TECHNICAL MISSION

Anglo-French Co-operation Foreshadowed

"Flight" photograph

(Above) The French technical mission at Bristol with Sir Stanley White and Mr. W. G. Verdon Smith. The members are (left to right) l'Ingénieur en chef Jean Volpert, l'Ingénieur en chef Basile Vernillat, l'Ingénieur J. M. P. A. Roos, le Commandant L. M. A. A. Montrelay, and le Capitaine G. E. Breyton. (Left) The party at Vickers' Weybridge works in company with Sir Robert McLean, General Cadell, Mr. T. C. L. Westbrook and Mr. Green (A.I.D.)

A DELEGATION of French technical experts has lately been visiting this country to study production methods. The party consisted of l'Ingénieur en chef Jean Volpert (Directeur des Constructions Aériennes, Membre du Conseil Supérieur de l'Air), l'Ingénieur en chef Basile Vernillat (Directeur du Service de la Production Aeronautique), l'Ingénieur J. M. P. A. Roos, le Commandant L. M. A. A. Montrelay (Etat-Major Particulier du Ministre de l'Air), and le Capitaine G. E. Breyton (Etat-Major de l'Armée de l'Air).

The visitors arrived in London last Sunday week and on the following day were received by Viscount Swinton, who talked with the members of the mission for nearly an hour. Subsequently there were informal talks at Aeriel House with the Director of Aeronautical Production and the Director of Equipment.

On the Tuesday the party was conducted over the engine shops of the Bristol Aeroplane Co., Ltd., at Filton, and next day witnessed construction of Blenheims at the company's aircraft plant. The delegation was introduced to Sir Stanley White, Bart., managing director, and Mr. W. G. Verdon Smith, C.B.E., J.P.

Having made the rounds at Bristol the visitors were taken to Birmingham to visit the Austin and Rover shadow factories, and next day proceeded to the Supermarine Aviation Works (Vickers), Ltd., at Woolston, later visiting Southampton airport, where the Spitfire multi-gun fighter and the Walrus amphibian were ably demonstrated by Messrs. Quill and Pickering. For the Saturday a visit to High Duty Alloys, Ltd., at Slough, was planned. Here the mission was received by Mr. W. C. Devereux and saw various departments in action, including the propeller shop and laboratory. Last Monday a tour was made of the Vickers Works at Weybridge, where the technique of geodetic construction was examined.

Although ostensibly the mission was observing British methods of production, the possibilities of Anglo-French co-operation were studied. Arrangements have already been made for the exchange of technical information between the two countries.

MANNA from the SKIES

AN extraordinarily good piece of work was done on Wednesday last week by an R.A.F. pilot from Aldergrove when an SOS was received from the island of Rathlin, seven miles off the Co. Antrim coast. The island had been isolated by gales for three weeks, and the 350 inhabitants were in distress.

F/O D. E. Gillam, who knew the island, was selected for the duty of taking supplies. Carrying a load of 350 lb. of foodstuffs and candles, he took off in a Westland Wallace of the Station Flight, and reached the island within half an hour. The islanders had been warned by telephone to light a smudge fire, and Gillam successfully put his machine down in a field measuring 200 yards by 300 yards and bounded by stone walls. He later took off and returned to the mainland.

An interesting comment reaches us from Mr. J. F. Tauton, secretary of the Norfolk and Norwich Aero Club. He says that the pilot in question was trained at the first Public Schools Aviation Camp at Norwich in 1934. When he obtained his "A" licence he had just left Wrekin College at the age of eighteen.

Also, last week-end, the Island of Foula, in the Shetlands, which had been isolated for nearly five weeks, and where there was an influenza epidemic, was relieved by a Highland Airways machine. Supplies, including medicines, were dropped in ten packages by a parachute.

For Motor Cyclists

"Hints and Tips for Motor Cyclists" (*compiled by the Staff of "The Motor Cycle"*); 2s. (*by post* 2s. 3d.); *Iliffe and Sons Ltd., Dorset House, Stamford Street, London, S.E.*1.

SOME general workshop hints of wide application (e.g., "drilling glass," "removing a broken stud," "shouldering a rod") are to be found in the new (13th) edition of this handbook, which motor cycle owners will find of the greatest value. Legal hints are also included.

IMPROVING the BREED

Mr. E. F. Relf Sums Up the Present Knowledge and Tendencies

TO but very few technicians is granted the gift of being able to express in language which the non-technical and semi-technical man can understand the fundamental conception which underlies highly technical problems. The superintendent of the Aerodynamics Department of the National Physical Laboratory, Mr. E. F. Relf, is one of the few so gifted, and last Thursday he lectured to the Royal Aeronautical Society about recent research on the improvement of the aerodynamic characteristics of aircraft.

Mr. Relf classified the aerodynamic characteristics into two groups: those concerned with performance and those connected with stability and control. Otherwise expressed, the two groups concerned economy and safety respectively.

The most outstanding tendency of aeroplane design at the present time, Mr. Relf said, was the continued effort towards higher speeds. Ever since Professor B. Melvill Jones called attention, in his famous paper of 1927, to the deficiencies of the aeroplanes of that day, there had been a gradual process of "cleaning up," until the aeroplane was now reduced almost to the limit of simplicity of external shape.

Apart from induced drag, the drag of the modern aeroplane was very largely due to skin friction. If only our knowledge of skin friction were complete, drag estimation would be a simple problem. It was rather a humiliating thought that after so many years we were still unable to estimate, with any reasonable degree of accuracy, what would be the drag of a new aircraft. The research now going on had been greatly facilitated by the development of the pitot-traverse method of drag measurement.

This method had extended the range of Reynolds Number from about 8×10^5 to 24×10^6, the latter value being obtained on a wing centre-section in the compressed-air tunnel at Teddington. Tests on a flat plate showed good agreement between the calculated and the actual drag of a flat plate at Reynolds Numbers above 3×10^6. Below that value the points lie on a transition curve.

Symmetrical Sections

Tests on symmetrical aerofoils gave very different results. The differences were due, as pointed out by Professor Melvill Jones, to the effect of curvature on the transition from laminar to turbulent flow in the boundary layer, and to the existence of a superimposed "form drag." At present the effects could not be explained in detail, but tests are to be made in the C.A.T.

Tests on cambered aerofoils showed that they tended to have a lower drag than symmetrical sections at low Reynolds Numbers presumably due to the transition point being farther back on the more highly cambered upper surface of the cambered aerofoils. At high Reynolds Numbers there was no difference in drag due to a two per cent. camber on the 21 per cent. thickness aerofoil, but at a thickness ratio of 25 per cent. the cambered aerofoil appeared to have a slightly greater drag. An aerofoil with the surface roughened with carborundum powder showed a marked increase in drag and illustrated the importance of smoothness at high speeds.

The few free flight tests made indicated lower drag than that found in the tunnel. This was due to the fact that under the non-turbulent conditions of the free air, the transition point, where turbulent motion developed in the boundary layer, was much farther back on the chord. In flight the position of the transition point on the upper surface had been found to be as far back as 0.35 chord. The transition point on the upper surface was known to be in a sensitive condition at high Reynolds Numbers, and a small ridge near the leading edge would make it go forward. So also would the disturbed conditions behind an airscrew. To secure the low drag resulting from laminar flow it was necessary to have smoothness of surface, and the front third of the surface should be kept free from any kind of local excrescence, such as joints between plates or a "ripple" in the plating. It was almost certainly impossible to retain the far-back transition in the slipstream, and so higher wing drag must be expected when a large fraction of a wing lay behind airscrews. Recent research had made it possible to calculate with fair accuracy what the skin-friction component of the drag would be if the point of transition were known. Form drag would probably also be amenable to calculation before long. Mr. Relf thought it would be found to depend intimately on skin-friction.

In marked contrast to results in older tests, modern tests on streamline bodies had shown that at high Reynolds Numbers all bodies of reasonable form had a drag approaching skin friction, the drag being but little influenced by shape and fineness ratio. Roughness had about the same effect as in the case of aerofoils, so that it was desirable to keep the surface smooth. The "break" in the lines of a body caused by the cabin top need not lead to any appreciable increase in drag if the surface was smooth and the fairing at the rear sufficiently long.

Interference Drag

Turning to the subject of interference drag, Mr. Relf said that as design had approached the lower limit of drag attainable, the importance of small interference drag was proportionately greater. Body-wing interference was one of the simplest, and unless a wing was very thick or was placed very low on the body large interference was not likely. By sweeping the wing roots up, as in the Heinkel He 70, the interference of a low wing was reduced. Interference tended to "clean up" with increasing Reynolds Number, so that if modifications to a model gave small interference one might expect the full-scale to be no worse than the model. Nacelle-wing interference was more difficult, and further research was desirable.

Model tests in the C.A.T. had indicated the degree to which we had approached towards the "ideal" aeroplane. A model of a civil aeroplane, in which everything had been sacrificed which would prevent the attainment of smoothness, had given an indication of what *could* be done. If all surfaces were made smooth and continuous the drag would be no higher than that predicted from tests of a smooth model in the C.A.T., and might be appreciably lower. Mr. Relf thought that, the necessity of smooth surfaces having once been thoroughly demonstrated beyond all question, design would ultimately triumph over the admittedly great practical difficulties. But the process must take time.

From the question of drag, or in other words performance, Mr. Relf turned to the problems of stability and control. These, he said, could not yet be said to be satisfactorily known. Longitudinal stability was the most important, and, fortunately, it was also the simplest from the analytical point of view. Stability over the whole speed range was comparatively easy to attain with the old thin-wing biplane, but was becoming increasingly difficult on modern monoplanes. The effect of the body and nacelles caused non-linearity in the pitching moment curve, and the large variations in c.g. position introduced difficulties. If the tail were made powerful enough to give stability at all speeds there was excessive stability at some speeds.

The effect of large c.g. range was more serious. A large tail would cure the trouble were it not for the fact that it involved a change of trim with flaps down, and larger changes of trim due to ground effect when landing.

Longitudinal Stability

Longitudinal stability with free elevators was of importance, and Mr. Relf referred to Mr. Irving's article on the subject in *The Aircraft Engineer* (monthly technical supplement to *Flight*) of October 28, 1937. The effect of slipstream on longitudinal stability was a serious problem, and there was not yet sufficient information available to enable it to be calculated with any precision. Research was in hand on a model of a typical monoplane in order to collect data and to endeavour to devise a general method of dealing with the problem.

No attempt had been made to calculate lateral stability, the number of important derivatives being greater than for the case of longitudinal stability, and most of them being difficult to determine by model tests. Usually the designer provided "weathercock" stability and used a certain amount of dihedral. In low-wing monoplanes the effective dihedral was often less than the geometrical dihedral. A large degree of weathercock stability aggravated the effect and demanded a still larger dihedral for stability. Lateral stability was not critically affected by mass distribution.

At the N.P.L. a simple test had been devised for determining lateral stability. The model was suspended in a particular way at the lower end of a long rod, and certain conditions regarding the weight of the model and its mass distribution must be observed. The lateral motion was a fairly close representation of what occurred when the model had complete freedom. It was too early to state whether the method would prove a success.

Of the tendency to "drop a wing," Mr. Relf said that this could be completely cured by the use of wing-tip slots and by "wash-out" of incidence. The latter method was not satisfactory because it needed so much wash-out that there was serious disturbance of the lift grading at top speed. Slots introduced moving parts and did not give an entirely smooth surface, so that designers would prefer to cure the trouble by modification of the wing tip shape. It seemed likely that the thing to avoid was a wing-tip section which had a *sudden* stall.

Mr. Relf had attempted to classify the nature of the stall of the 78 aerofoils of N.A.C.A. Technical Report No. 460. A diagram shown indicated that three types of section had a gentle stall: very thin sections, very thick sections, and those of medium thickness which had a high centre line camber and far-back position of maximum camber. The last were the most suitable from a practical point of view, but had the disadvantage of higher profile drag. Flight experiments were necessary, as stalling phenomena were sensitive to scale effect. A series of flight tests might enable a satisfactory tip design to be found.

The present position as regards design precautions against flutter seemed satisfactory, but Mr. Relf was not sure how long it would remain so. Speeds were increasing rapidly, and since flutter could be broadly described as a state in which certain aerodynamic forces win in a fight with elastic forces, it could not be assumed without proof that the measures which succeeded to-day would also succeed at the speeds of the future. At very high speeds mass-balancing of controls might not give sufficient precision.

Mr. Relf described a new technique in which the model is forced to oscillate at a given frequency and with a given amplitude. The force is transmitted to the model through a short length of nickel tube, and by making use of the magneto-striction effect in nickel the variations of stress in the tube are converted into variations of electric potential, which can be recorded by a cathode-ray oscillograph. Thus, a time history of the force during a complete oscillation is obtained.

Until flutter theory was firmly established the designer should continue to apply the present remedial measures, and should keep an eye open for any innovations in design which tended to increase the number of degrees of freedom in any possible mode of flutter. There was great attraction in decreasing the number of degrees of freedom, and one development was the adoption of irreversible controls. Such a control, applied to the aileron, reduced the wing flutter to the simple case of flexure-torsional flutter, with only two degrees of freedom. The mechanism must, however, be perfect and free from backlash. Whether the same conclusion would apply to irreversible control of rudder and elevators was not yet known. A really good mechanical device might go far towards the simplification of design against flutter dangers.

BIRTH of a BEARING

How Aircraft and Other Ball and Roller Bearings are Made

A RECENT mention of ball bearing production among some uninitiated people revealed that the basis of their knowledge of the subject was a vague idea that molten metal was allowed to drip from the top of a tower on the lead shot principle! A visit to the Birmingham works of British Timken, Ltd., demonstrates very quickly what a highly specialised work the production of ball and roller bearings really is. The firm is specially noted for its tapered roller bearings, which have a number of applications in aircraft.

Small rings have several operations carried out on them by automatics, while larger jobs, up to 15in. diameter, are dealt with by No. 5 Herberts. The largest horizontal lathe is the No. 20 Herbert, and for larger jobs still boring mills are used.

Following machining operations the inner and outer rings are hardened and, to assure concentricity, are "jig-quenched," that is, quenched while clamped in true shape to prevent distortion.

Grinding and finishing come after degreasing. Outside surfaces of small and medium rings are fed through centreless grinders, and, for the inside, Heald machines are used; in the case of parallel bores the machine gauges as it grinds.

Many of the smaller rings are hopper-fed to the grinding machine, through which, in some cases, they are passed three or four times.

For final grinding, rubber-bonded grinding wheels are used. During operations the parts are viewed at frequent intervals for size and finish. In certain cases the inspection actually costs more than does the production of the part.

Rollers of large sizes are forged hot from suitable billets, and smaller balls and rollers are cold headed. It is interesting that although the size of bearings made by British Timken varies from 55in. (a special order for a gun barrel boring lathe) to less than one inch, the method of production of the balls and rollers is practically the same whether large or small.

Finished rollers are graded by ingenious American-designed machines. Depending upon the depth of entry of each roller into a grading collet, an electric contact is made, causing a trap and guiding flap to open across the conveyor belt carrying the rollers. The rollers are in this way graded to a limit of 0.00025in.

The finishing of steel balls—a process at which British Timken claim to be unsurpassed in the world—is simple in theory. The balls must first be annealed to relieve stresses set up in pressing them from wire into a rough sphere. Rough grinding is carried out with the balls held loosely in a circular groove with the grinding wheel under spring pressure turning horizontally below. For final grinding the balls are lubricated with paraffin while turning between vertical stones cut with a large number of concentric grooves of semi-circular sections. The final finishing and polishing operation is barrelling. This gives the well-known bright finish and accuracy to 0.00005in.

Essential parts to several types of bearing which have not so far been mentioned are the cages for locating balls or rollers. These are produced by a series of neat and rapid operations from strip, blanked, pressed, and then notched in pocketing machines, and finally having the edges radiused. For several of the bearings the inner and outer rings and cages are given a rust-resisting finish.

S.B.A.C. Scholarship Vacancies

APPLICATION forms from boys wishing to apply for this year's S.B.A.C. scholarships must be in the hands of the Royal Aeronautical Society by the end of this month.

Last year five scholarships were awarded, and the number is unlikely to be less this year. The scheme, sponsored by the S.B.A.C., provides a four years' apprenticeship in an aircraft or engine works, facilities for attendance at technical classes, experience in the drawing office and research departments, and a working wage.

Applicants for the scholarships must be British subjects between 16 and 18 years of age and must have a school certificate or its equivalent. Forms of application may be had from the secretary of the Royal Aeronautical Society, 7, Albemarle Street, London, W.1.

The Willingdon Trophy

THE Royal Aero Club has been informed by the Aero Club of India and Burma that the award of the Willingdon Challenge Trophy will be made in May, 1938, and will be for the year ending December 31, 1937.

The Trophy, presented by the Marquess of Willingdon, will be awarded annually for the most meritorious performance during the year, carried out in any part of the world, by any Indian national or any person trained in India for six months in the calendar year for which the award is made. Pilots should send in their applications to the Secretary, Aero Club of India and Burma, New Delhi, together with full details, and proof of six months' residence in India during the year.

A Pobjoy—but Not from Rochester

SOME confusion appears to have occurred during the last few weeks as a result of the fact that a new company which has recently commenced operations bears the title of "The Pobjoy Aviation Co."

Actually, it has no connection with the old-established Rochester organisation of Pobjoy Airmotors and Aircraft, Ltd. It so happens that the founder of the new concern, which has premises at 100, Richmond Road, Dalston, London, E.8, also bears the somewhat uncommon name of Pobjoy—he is Mr. R. Pobjoy, but is no relative of Mr. D. R. Pobjoy.

The London firm intends to market a light two-seater to appeal to clubs and private owners, and has made a sensible start by circularising clubs and others in order to find out what type of machine is most likely to appeal. The questionnaire enumerates a score of questions dealing with such things as seating arrangement, type of engine and horse-power, dimensions and performance instruments required, etc.

Although the company have not yet co-related the replies, it seems likely that the type produced will be an inexpensive wooden low-wing side-by-side seater with an air-cooled engine of about 50 h.p.

COMMERCIAL AVIATION

SURVEY FLIGHT : A striking study from the Empire boat, *Centaurus*, passing Mount Egmont, New Zealand, during her recent survey trip to the Dominion.

THE WEEK AT CROYDON

—and Elsewhere : Lighthouses and Things : New Pilots : Cutting Out "Yurrup" : Wanted — Better Alternative Airports

WE at this airport are in a somewhat similar position to the unfortunate inhabitants of St. Ives, Cornwall. They used to have an adequate navigation warning in the Godrevy Lighthouse, but a couple of years ago the authorities reduced its power considerably —without, I wager, consulting local experts. Four ships have been wrecked since, and those who really know—the coxswain of the lifeboat (who nearly lost his life there recently), the captain of the latest vessel wrecked, and the Deputy Mayor of St. Ives—all say that the light is inadequate and is outshone by the street lighting. Although the present lighthouse reminds one of a dying glow-worm on top of a shaving stick, the responsible body (presumably the Elder Brethren of Trinity House) seemingly regard the thing as eminently satisfactory. They should send a delegate to that tavern, "The Sloop," on St. Ives Quay, where the men who have to risk their lives on that coast forgather. They would learn a lot.

We at the Airport suffer from wholly unnecessary pylons, dangerous to navigation, and nobody asked the local experts before erecting the one to which we all so strongly object.

Some Elderly Auntie from Ariel House should visit the hotel bar and hear what those who have to risk their lives dodging unnecessary obstructions have to say about this matter. The atmosphere, being human, might seem strange to Auntie at first, but I think she would return to the fold convinced that a policy of long-term brooding over this error of judgment will not do.

In Contrast

As a matter of fact, I find it hard to believe that the same people who do this inconsiderate pylon-building are responsible for the recent reorganisation of air traffic control in this country, which all air transport companies must welcome. This time last year traffic control was all hither and yon, and there seemed to be no coherent policy. Now one sees signs that the whole problem has been taken in hand, and that there is a clear policy purposefully pursued. More, it is evident that this is no flash in the pan, but that there is someone at the wheel who knows where he is steering for and means to get there.

Getting ready for the summer rush, I suppose, Swissair have just engaged four new pilots—making ten in all. Their names are: Hans Ernst, Robert Fretz, Pierre Senn and Antoine von Tscharner. K.L.M. is understood to have engaged a couple of American pilots with extensive Douglas experience, one of whom, with wife and family, is already in Holland. He is L. M. Gravis, formerly of United Air Lines. Another K.L.M. appointment is that of Georg Klein (who was at Croydon last week), a former D.L.H. pilot. [A note on these appointments appears on p. 131.—ED.]

I am told that there is a big increase in American tourists to the Far East who cut out Europe altogether—for which, what with all this goose-stepping, waving of arms, clenched fists, hammers, sickles, rising suns complete with sunspots, and what-not, I don't blame them. The way they travel is by Italian Lines, arriving from New York at Naples Tuesday or Saturday afternoon, and transferring to a K.L.M. machine next morning, which takes them on to the East. It is thus possible to reach Karachi in 11 days, Singapore in 13 days, and Java in 14 days from New York. By transferring to Qantas Empire Airways at Singapore the journey from New York to Brisbane can be done in 17 days.

The example of British Airways, who some time back commenced using the Link trainer for pilots, has now been followed by K.L.M.

Hilaire Belloc, in *The Old Road*, discussing early navigation across the English Channel, says: "Now complexity of tides involves a multiplicity of harbours, and many neighbouring harbours, among which seamen choose as necessity may drive them, involve a common centre inland" (Canterbury). If for "tides" you read "fogs and the complexity of traffic control in the air," the position of those who sail the air to-day towards a common centre inland (Croydon) is much the same as that of the coracle or dug-out sailor. A multiplicity of harbours of refuge, outside the controlled zone, is absolutely essential. If during QBI a passenger machine may be kept outside the zone for half, three-quarters or even a whole hour, emergency ports are a necessity. *But* they must be just as well equipped as the normal terminal and just as easy to get into. This ground organisation must be first class and proper Customs and passport facilities must exist, with none of this business of hanging around for hours whilst Excise people are hunting the countryside for illicit stills and so forth. Those in charge of traffic control could do much to ease congestion around Croydon and Heston by offering adequate alternative airports. Now, for the first time, I see some prospect of something being done in this way, for, as I remarked earlier, the whole big question of traffic control at last seems to be receiving attention.

A good and true story was told last week of a lady passenger aboard an Empire boat which was at rest, refuelling, on the Nile. A large fish came alongside and intimated, presumably by means of a string of bubbles, that it was about time for "elevenses." I feel sure it answered to the name of Nelson (of the Nile) and had a smaller brother, minus its tail, called Half-Nelson. Anyway, it ate bread from the lady's hand. Alas! later she borrowed string and cruel bent pins and, according to report, hooked the whole Nelson family. Was it cricket, I wonder? Let us hope no foreign broadcasting station gets hold of the story and starts stirring up Nilotic mud on the subject. I would not put it past some folk to run a special "fishes-hour" for Eastern fish, by means of a performing announcer trained to do his stuff head down in a tub of water. A good line would be to point out that the British kipperise poor fish, whereas more cultured nations merely boil them in oil.

A. VIATOR.

Doncaster "Mayburyised"

ANOTHER link in the Maybury chain was forged last week when the Air Ministry took over control at Doncaster Airport.

Control officers have been installed. Later, trainees from the Air Ministry control officers' school may be attached for periods of training.

Selling Airports

IT is a significantly useful fact that quite a number of municipal airport authorities have seen fit to produce booklets describing the particular amenities of their airports.

One of the latest of these has been issued by the Leicester Airport Committee, and the information therein is printed in French, German, and Dutch, as well as English.

New K.L.M. Pilots

AMONG new K.L.M. pilots are Mr. L. M. Gravis, formerly of United Air Lines, and Herr Georg Klein, of D.L.H. Klein first made his name by his direct flight across the South Atlantic. He has been one of the pilots flying the Dornier mail service between West Africa and Brazil. He has also flown with Scadta, the Colombia operators, and in Europe he has gained a reputation as a night flyer.

More Imperial Dismissals

EIGHT probationary Imperial Airways' first officers last Friday received a month's notice. A reported statement by an official of the company was as follows:—

"Probationary first officers are not fully qualified air transport pilots, as they are undergoing training before beginning actual flying service.

"The number of pilots required by any large air transport concern has to be estimated a considerable period ahead to allow for the necessary interval for training. It is not uncommon, consequently, in any large company comparable in size with Imperial Airways to find that a small proportion of the total flying personnel in training is at times superfluous."

Ski-liners

THE fast service from Croydon to Geneva which Air France introduced just before Christmas largely for the benefit of winter sports enthusiasts has been proving very popular at week-ends. By cutting out the change-over at Lyons and flying direct across the Jura mountains from Paris to Geneva, the time taken on the flight from Croydon is only four hours —9 a.m. to 1 p.m. Potez 64 machines are used.

Such favourite winter sports grounds as Villars-sur-Bex (where the "air-minded" president of the Villars Ski Club, M. Lendi, is always ready to welcome air travellers at the Villars Palace), St. Cergue, Gstaad and Chamonix have had a larger number of English visitors than for some years, and many of them have come by air. At Villars, Air France have instituted a Ski Challenge Cup, to be competed for annually. This year it was won by Mark Hodler, a Swiss University student from Berne, with Palmer-Tomkinson, of Eton and Oxford University, a close second.

The normal Air France route to Geneva, and that used except at week-ends, is the feeder service from Lyons which has for the past nine years been operated almost single-handed by Chief-pilot Charpentier with a three-engined Fokker.

Straight Corporation to Control Western Airways

WESTERN AIRWAYS, LTD., it is announced, are shortly to come under the control of Straight Corporation, Ltd. Although the latter concern does not intend to become an airline operating firm—Mr. Whitney Straight prefers to content himself with the development and extension of his chain of aerodromes—the operation of certain services hitherto operated from Weston-super-Mare Airport will be taken over.

Chief among these, of course, is the wonderfully popular Weston-Cardiff ferry which, operating hourly summer and winter, has carried over 30,000 passengers in eighteen months. Fares are to be reduced to 6s. 6d. single and 9s. 6d. return, while a book of twelve return tickets will be available for £5. These rates are considerably lower than the third-class railway fare and the journey takes only eight minutes as compared with the two and a half hours by rail.

Renewal of the summer Weston to Birmingham service is under consideration, and a licence is being taken to operate the Le Touquet and Paris service (previously run as a seasonal business from Bristol), though it is probable that it will only be operated "on demand." It is possible, also, that services may link up with the Straight-operated airports at Exeter and Plymouth.

The ferry is to be worked with three or four D.H. Rapides, which will be under the operational management of Flt. Lt. Knowlden, late of Plymouth Airport.

Mr. Norman Edgar, whose pioneer work in airline operation in the West Country has been of value to so many business people and others, will remain in the new organisation as commercial supervisor for Straight Corporation.

Improvements of aerodrome and ground transport facilities at Weston and elsewhere will also be the aim of the new administration.

Rand-Rhodesia

SOUTH AFRICAN AIRWAYS are now operating a passenger and mail service to Bulawayo from Johannesburg every Sunday, Tuesday and Thursday, reaching Bulawayo in two and a half hours. There are southward flights from Bulawayo on Mondays, Wednesdays and Fridays. Rhodesian and Nyasaland Airways are operating a link service to Salisbury.

Delivered Personally

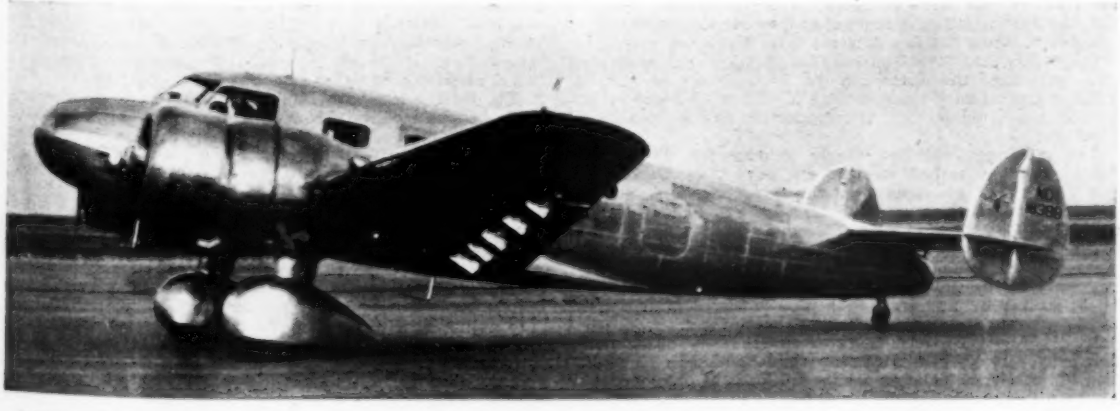
ONE of the latest D.H. Rapides, the third ordered by Wilson Airways of Kenya, was recently due for delivery. Capt. G. de Havilland, technical director of the D.H. Company, decided that here was an opportunity for a flying trip to East Africa.

Piloting the machine himself, and accompanied by Mr. F. T. Hearle (director and general manager) and two other passengers, Capt. de Havilland left Hatfield on January 18. Flying by easy stages, and without radio, they reached Nairobi nine days later.

They made the 500-mile Mediterranean crossing from Nice to Tunis in 3 hrs. 57 min. At the former place, incidentally, they by chance met M. Jean Stampe, the Belgian D.H. agent, who had come from Algiers in his own Leopard Moth.

Wilson Airways' fleet now comprises, besides the three Rapides, a Dragonfly, a Dragon, two Vega Gulls, two Leopards and two Puss Moths.

A photograph of Capt. de Havilland and Mr. Hearle appears on p. 126.



DECEPTIVE APPEARANCE: The new American Barkley-Grow light transport with two 400 h.p. Wasp Juniors. Although this machine looks like a Lockheed 12 with a fixed undercarriage, its structure is really unique, the wing having no ribs or bulkheads. A top speed of 225 m.p.h. is claimed and the payload (six passengers, freight and baggage) is 1,450 lb.

Commercial Aviation

A SITE IN CYPRUS

NICOSIA aerodrome, in Cyprus, has for long been a snare and a delusion on the flying maps of the world. Actually the presence of so poor a place on recognised maps is a menace, and is voted as such by every pilot who has experienced it in even moderately bad weather conditions.

These fine-weather landing areas possessing nothing in the way of housing facilities or buildings of any kind should be classified very distinctly.

In view of the important geographical position of Cyprus in relation to existing air routes, it is interesting to note that at Larnaca, on the south coast of the island, there is being laid out an aerodrome which may conceivably be a future airport of the first degree. The area is at present being cleared to the dimensions of 1,000 yards × 700 yards. Its approaches are perfect in all directions, being entirely free from any kind of obstacle.

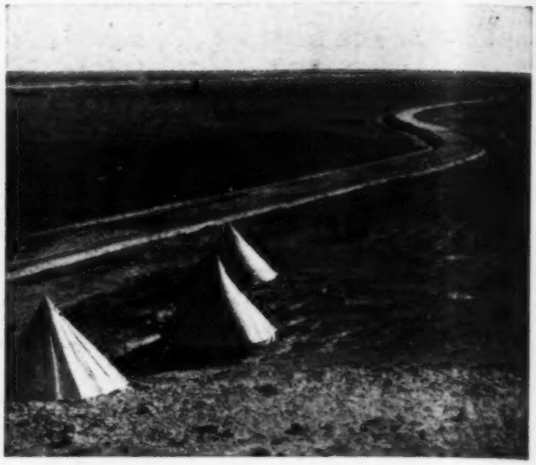
The present surface is good, and a correspondent who was recently flying in that part of the world says that he drove all over the aerodrome in a car at 30 m.p.h. without finding more than three ridges which might cause a ballooned landing. An eight-ton roller is at present in active use, and it may be expected that even these minor faults will be eradicated.

The soil is good loam, but has yet to be tried out in bad weather. It is understood that trials with a heavy lorry are under contemplation now that the January rains have soaked the terrain

About twenty miles to the north-west is situated Stavrovouni Mountain, which has a peak forming a good landmark. To the south is Kiti Lighthouse, and to the north and north-west sides are salt lakes which in summer dry to a bed from which salt is collected, and from which revenue to the extent of £30,000 accrues to the island.

The municipality of Larnaca is carrying out the work of construction, and the Government are paying a sum of £4,000 for the construction of a road from the present main road to the aerodrome.

The Eastern Telegraph Company has a radio station situated at the north end of the town, two miles from the aerodrome circle. Even now it performs good service to aircraft using the Near and Far-East routes. Operators are permanently on duty night and day, and service includes meteorological reports. The prevailing winds are S.E. to S.W. from May to November, with a maximum velocity of 25 m.p.h., and N.W. to N.E. from December to April.



An unbeautiful landscape, but one giving a good idea of the clear approaches to the Larnaca site. The new road can be seen

In conclusion, a portion of the speech made by Sir Richmond Palmer after presenting the O.B.E. to the Mayor and Solicitor-General of Larnaca at a luncheon given by the municipality on November 6 may be quoted. Sir Richmond said: "You have here at Larnaca the best—by far the best—natural commercial aerodrome site in the island, and thus Larnaca's future can probably be accurately described as being 'in the air' rather than 'in the clouds.'"

Southampton Improvements

THE Southampton Airport Committee has now asked the Borough Engineer to draw up plans for a terminal building, this to include all the usual accommodation, as well as a restaurant with a good view of the aerodrome. Estimates for an additional hangar are also being prepared.

Jersey Traffic

MORE than 2,500 aircraft arrivals and departures have been booked at Jersey Airport between the date of its opening, in the early part of March, and the end of last year. These machines carried a total of 32,442 through passengers on Jersey Airways' services with more than 450 tons of excess baggage, freight and mail—figures which suggest that this airport is at least justifying its existence.

Allied Airways Appreciated

THE Norwegian Ministry of Defence has shown its appreciation of the work of Allied Airways (Gandar Dower), Ltd., by recommending a renewal of their Newcastle-Stavanger concession, which has just expired, until the end of 1941.

It has also been recommended that Allied should be granted leave to extend the North Sea run from Stavanger to Oslo, utilising the military aerodrome at Kjeller until Fornebu Airport is completed—which, it is expected, will be some time next year.

The company will accordingly resume the crossing on April 10, flying, as last year, on five days a week. In May, test flights will be made over the new extension, utilising a D/F. service which is being installed at Kjeller for their benefit.

Allied and Highland Airways, incidentally, have been having plenty of fun nearer home during the recent gales. On one day towards the end of January, when the wind was gusting up to 90 m.p.h., and hailstorms were almost continuous, the Orkney-Thurso steamer was unable to make the crossing. Not only did Allied Airways continue to schedule, but actually flew extra services to make up for the lack of sea communication, Capt. Henry Vallance taking full loads of passengers and newspapers between Stromness and Thurso.

The Shetland air mail has been flown from Aberdeen three times a week since November 23, in spite of the lack of radio facilities at the latter place, and 96 per cent. regularity is claimed.

Condors for D.D.L.?

THE machines of D.D.L. (Danish Airlines) in 1937 flew an aggregate of 598,000 km. (371,500 miles), an increase of 30 per cent. over the preceding year's mileage. The total number of passengers arriving at or leaving Kastrup was 46,000, as compared with 33,000 in 1936—an increase by nearly 40 per cent.

As to the purchase of new equipment, for which purpose capital was provided by means of the recent reconstruction of D.D.L., the company has changed its mind. It is reported that the idea of buying two Douglas D.C.3s has been abandoned in favour of the new Focke-Wulf Condor. Powered by four engines developing 2,880 h.p., this German 26-seater will cruise at 335 km./h. The purchase of two Condors, each estimated to cost one million kroner, is said to be likely.

Out of Chaos

THE Sino-Japanese conflict, through its interruption of ground transport services, had, at least until a month or two ago, reacted favourably upon Chinese air services. The China National Aviation Corporation has been operating a special mail service between Hankow and Chungsha in Hunan, on a two-way, thrice-weekly schedule, in addition to its Upper Yangtze service and the Chungking-Hong Kong service.

The air services with Nanking and Wuhu have, of course, been discontinued, but round-trip air services between Hankow and Kuikiang, and Hankow and Changsha, four days a week, have been operated.

Air Insurance and War Risks

A CLAUSE recently adopted by the War Risk Committee of the Institute of London Underwriters puts air-borne traffic in the same relative position as water-borne traffic in regard to war risks. In effect, it rules out cover "on shore."

The clause stipulates that the insurance "shall not attach to the interest prior to entering an aircraft, or after discharging at the final place of discharge, or after the expiry of 15 days, counting from midnight of the day of arrival of the aircraft at the final place of discharge, whichever shall first occur." Also, insurance cover the interest at an intermediate place, whether during transhipment or not, "after 15 days (counting from midnight on the day of arrival of the aircraft with the interest) until the interest finally leaves such place, or, in the event of transhipment, enters the on-carrying aircraft."

STILL SIMPLER D/R

The Operation of the Dalton Model G Computer Described : One-Handed Accuracy

EVER since my *ab initio* attempts at air navigation twenty years years ago I have lived in the hope that one day some heaven-sent genius would devote a part of his time to producing the ideal course and distance calculator (C.D.C. to you). During those (too many) years I have handled many types of calculators, but they all possess numerous and varied drawbacks.

Some attain near-perfection in certain directions, but only at the expense of serious imperfections in others. Some require at least three or four hands for their manipulation, while others would have required an extra cockpit in the aircraft to accommodate them. Some were so complicated that the rules of chess were simple by comparison. One at least cost (but not to me) £50. Some . . . but need I continue? You know them as well as, or better than, I do.

Whatever disadvantages they may have, most have one disadvantage in common. They are either difficult or impossible to use in the air, the one place where they are really wanted. Above all, they are all nearly impossible for use in the air by the pilot-navigator because they cannot be manipulated with one hand. Very few machines will stay on an even keel in bad weather whilst the pilot leaves the controls to wrestle with the usual C.D.C.

This great disadvantage has been overcome by Mr. Philip Dalton, of the U.S.A., with his "Model G. Dead Reckoning Computer." I have been the proud possessor of one of these ingenious instruments for a week, and if I were a film critic I would certainly award it ****. [The Dalton Mark VII Computer was described in last week's issue.—ED.]

Simple, Quick and Accurate

I have certain minor criticisms to offer, but they are more than outweighed by my appreciation of this instrument's good qualities. It is robust, and at the same time light and compact, simple, quick and accurate to use in the solution of the various problems encountered in dead reckoning air navigation, and, above all, the most difficult problems can be solved both on the ground and in the air by the use of one hand only. To those navigators who have anxiously wrestled with "interception" problems it seems almost impossible that these can be solved by two or three pencil marks on the face of the instrument together with the manipulation of two operative knobs, all done with one hand (and nothing up the sleeve).

The instrument consists of a flat box 5in. wide by 6in. long and 1in. thick, with a hinged cover on top and two operative knobs on the right-hand side. Two leather straps enable the instrument to be fastened to the operator's leg above the knee. As an alternative the straps can be removed and the instrument permanently installed in some suitable position in the machine.

On the instrument cover is a circular "time and distance" slide-rule, and when this cover is hinged back a note pad

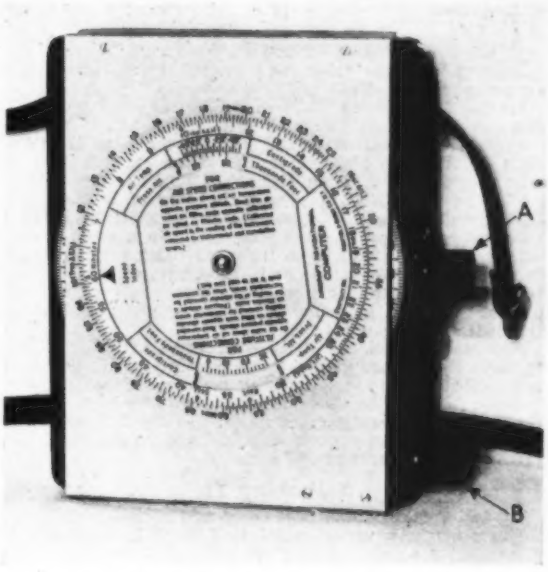


Fig. 1.—The Model G Dalton Computer with case closed, showing the time-and-distance calculator. At the side are the operating knobs for the "compass ring" and "polar co-ordinate" chart inside.

fastened to its under-side is made available and the face of the wind calculator is exposed. This consists of a transparent plotting disc mounted on a rotatable "compass" ring, i.e., a ring engraved 0-360° at 1° intervals, which is rotated by one of the operating knobs (A in Fig. 1). Underneath the transparent disc is a section of a "polar co-ordinate" chart, in the form of an endless belt mounted on rollers. This simple device has overcome the bugbear of all C.D.C. designers—how to obtain a reasonably large scale and at the same time to keep the size of the instrument within reasonable bounds. This scale covers speeds of 30 to 290 m.p.h. (or knots). This chart is moved up or down by means of the other operating knob (B in Fig. 1).

Above the compass ring is a "True Heading Index" on which is engraved a scale 45°-0°-45° (at 1° intervals) with a lubber mark in the centre. This scale can be used to apply the magnetic variation, and thus entirely eliminates the necessity of dealing with true courses. This scale is also used to apply drift angles in order to read the track, etc.

Space will not permit a full description of the methods of solving all the possible navigation problems by this instrument, but the following three problems, together with a description of the solution, will serve to show that my rather extravagant praise is fully justified.

Note: Figures are given in the three problems to allow

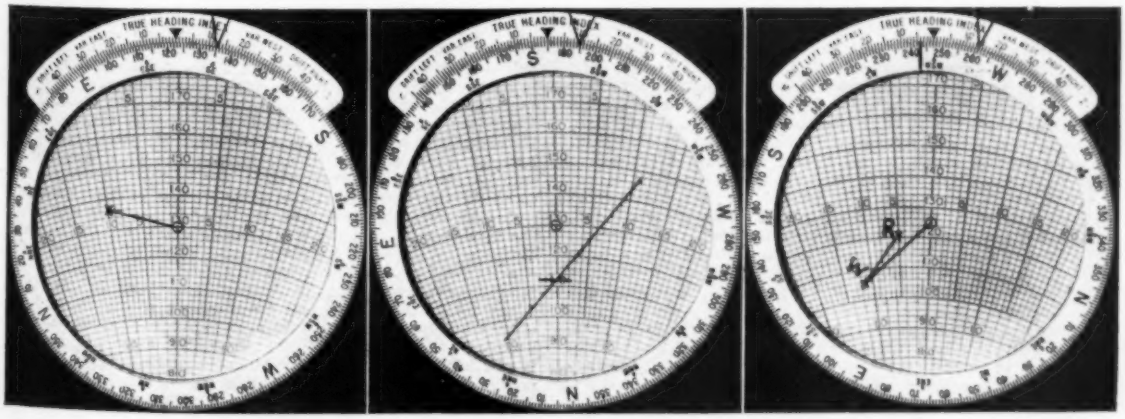


Fig. 2 **Fig 3.** **Fig. 4**

Three demonstration problems, worked out in the accompanying description.

readers to check (if they so desire) the accuracy of the instrument by plotting.

Problem I.

To find the true track, and ground speed, for a given magnetic course and airspeed.

Given: Mag. var. 12° W.; wind S.W. 24 m.p.h., aircraft's course 134° magnetic; and airspeed 130 m.p.h.

Procedure:—Pencil mark the magnetic variation 12° to the right of the True Heading Index. Turn knob A until the wind direction (S.W.) is set against the True Heading Index.

Plot the wind (O-X Fig. 2) from the centre of the transparent disc straight down the centre line of the chart, to equal 24 miles according to the chart scale (actually a small mark is sufficient). By turning knob B set the chart to read the airspeed (130 m.p.h.) at the dot in the centre of the disc. Set the compass ring to read the machine's course (134° magnetic) against the pencil mark indicating the magnetic variation on the drift and variation scale.

Solution:—At the end of the wind arrow read the drift (10° to the left) and the ground speed 137 m.p.h. Opposite 10° left on the drift and variation scale read the true track 112°.

Note: Actually the above procedure takes far longer to write down (or read) than it takes to do. Two pencil marks only are made: (1) The magnetic variation, and (2) the wind. The rest is done by turning two knobs.

Problem II.

To find the wind from drift observations (double drift).

Given magnetic variation 10° W.; airspeed 130 knots; 1st course 60° magnetic, drift 5° to port; and 2nd course 115° magnetic, drift 8° to port.

Procedure:—Pencil mark the variation (Magnetic Heading Index) 10° W., on the drift and variation scale. Set the chart to read the airspeed (130 knots). Set the first course (60° M.) at the Magnetic Heading Index. Trace with a pencil from the chart the track 5° to the left of the centre line.

Set the second course (115° M.) and make a mark where the second drift line (8° to port) crosses the first drift line. By means of knob A bring the wind point (the intersection of the two drift lines) vertically below the centre of the transparent disc. The wind direction 186° is read at the True Heading Index, and the centre-line scale gives the wind speed as 18 knots.

Problem III.

To intercept a ship:—Var. 14° W.; wind W.N.W. 30 knots; ship's velocity 100° (T) at 20 knots; airspeed 125 knots; and bearing to ship 243°. Distance 86 miles.

To find the Magnetic course to steer to intercept the ship:—Rate of approach; ground speed; track; and time of interception.

Procedure:—Pencil mark the mag. variation, 14° W. (Mag. Heading Index) and the wind vector as in the previous examples. Set the ship's course (100°) at the True Heading Index. By means of knob B adjust the upper edge of the square grid chart under the wind point (W.) and plot the ship's speed (20 knots) down the vertical grid lines from the wind point. To mark the relative wind point (R), set the airspeed (125 knots) at the centre of the disc. Pencil mark on the compass ring the line of approach to the ship (243°), and orient the transparent disc until the relative wind point (R) reads on the chart the same angle (5° left) as the line of approach (243°) makes on the drift and variation scale.

Read the course to steer (262° Magnetic) against the Magnetic Heading Index. Read the rate of approach 120½ knots from the chart at R. Read the drift angle (11° to port) at W. If this is applied to the course, the track (237° True) is obtained.

One sentence in the instructions accompanying the instrument struck me very forcibly, i.e., "It should be remembered that the accuracy of dead reckoning navigation depends just as much upon the accurate calibration of the airspeed indicator and the proper application of its corrections, as upon the accurate calibration of the compass." How true this is, and how often it is forgotten!

Now for my criticisms. (1) The cost—this is rather high at the moment, but I understand that this may be remedied in the near future when quantity production commences. (2) It would be an advantage if provision were made at the side of the instrument to hold a pencil and eraser. (3) When strapped to my knee the cover hinges back against my somewhat corpulent figure, and I am sure the same would occur with a less corpulent figure when wearing a flying suit. It would be an easy matter to arrange the cover to open sideways.

The computer is to be made by Henry Hughes and Son, Ltd., whose sales are handled by Smith's Aircraft Instruments, London, N.W.2. C. W. M.

IN EIRE LAST YEAR

Commercial and Club Flying Reviewed : Planning for the Future

COMMERCIAL aviation began to find its feet in Ireland —or Eire—in 1937, and there was a considerable increase in the traffic on the cross-Channel routes. Mails, which had not previously been airborne from the Free State area, were carried on the Dublin-Isle of Man service during July and August, and the Minister for Posts and Telegraphs announced that discussions had taken place with the British Post Office with a view to the establishment of an air mail service between Dublin and London.

The number of passengers cleared at Baldonnel aerodrome, County Dublin, during the first nine months of the year, was well over 100 per cent. greater than in the previous year. The comparative figures were: 1937, inwards 1,687, outwards 1,724; 1936 inwards 589, outwards 663.

The development of Irish Sea Airways (the organisation operated by Aer Lingus Teoranta and Blackpool and West Coast Airways), was largely responsible for this increase. The services operated by this organisation were increased to two machines a day in each direction between London and Dublin and, for the peak period of the holiday season, three machines a day in each direction between Dublin and the Isle of Man. Northern and Scottish Airways and Railway Air Services operated five machines in and out of Ards during the summer. The number of passengers who passed through this airport between October 1, 1936, and September 30, 1937, was 7,116. During August 1,322 passengers were handled. This airport was extended during the year, the longest run being now 1,007 yards. The North of Ireland Flying Club, which operates at Ards, had trained twenty-two "A" licence pilots by the end of November.

Despite the progress of air transport in the Free State area, private flying received little support. The Irish Aero Club, after being in existence for nine years, went into voluntary liquidation in December. The demise of this club reacted unfavourably on the Irish Junior Aviation Club, which had been reorganised and was working a flying training arrangement with the senior body. Some flying instruction was carried out at Kildonan aerodrome by Dublin Air Ferries and a new organisation, the Tramway Aero Club (composed of members of the Dublin tram and omnibus company staff). The number of aircraft registrations valid in the Free State at the end of September was 14, compared with 12 on the corresponding date of 1936. The number of "B" licences increased from five to six, but the number of "A" licences decreased by three to thirty.

In order to permit Eire to take its place in the joint British-Canadian-Irish organisation which is to operate the transatlantic airway, a new company, Aer-Rianta Teoranta, was formed under the Air Navigation and Transport Act, 1936. This company will carry out all commercial flying, with subsidiary companies, in the former Free State area.

Tests of the Shannon base by the Empire flying-boat *Cambria* early in the year proved successful and, in July, *Caledonia* and the Pan-American *Clipper III* made the first survey flights between Foynes and Port Botwood. Between July and the end of September, seven crossings were made in each direction. All proved satisfactory and conferences to consider the results were held in London and Dublin. In November Mr. T. J. O'Driscoll, who was in charge of the Shannon airport during the transatlantic tests, sailed for America with Mr. R. W. O'Sullivan, the chief aeronautical engineer of the Army Air Corps, for further discussions and to study the working of the U.S. Bureau of Air Commerce.

Considerable progress was made with the construction of the land airport at Rynanna, County Clare, for the Shannon air base. At the Dublin Municipal Airport (Collinstown) the site was sufficiently developed to permit the preparation of a mile-long runway for the transatlantic tests of the D.H. Albatross. Collinstown will cover about 500 acres, and the airport at Rynanna about 700 acres. While Rynanna is being financed entirely by the Government, the Dublin Corporation is providing £58,000 towards the cost of Collinstown. Meanwhile, the Cork Airport Committee has selected a site in the Midleton-Carrigtwohill area for its aerodrome. The Government will bear half the cost, the local authorities sharing the balance.

In Northern Ireland a licence was granted to the Belfast Harbour Commissioners for their aerodrome at Sydenham.

NETHERLANDS TERMINAL

Improvements at Schiphol : Traffic Control Methods : Training the K.L.M. Pilots : Maintenance in Excelsis

By H. A. TAYLOR

JUST at present it seems to be a good Continental rule to prepare on a grand scale for future air developments. Although comparatively little has been heard of it recently, Amsterdam's airport at Schiphol has been no exception. During the past year the landing area has been more than doubled and asphalt runways have now been completed in the original area. These will be extended into the new area—which can already be used by lighter machines—during the coming year, so that eventually the paved take-off runs will be more than 1,000 metres in length and the maximum possible run very nearly two kilometres.

Ground organisation is the most important accessory to modern air transport development, so it is reasonable to describe first of all the airport layout and its traffic control system. Any inspection of Schiphol, however, would be incomplete without a study of K.L.M.'s operational methods and maintenance shops and, in any case, even Schiphol would cease to have its present importance in world air transport if it were not for K.L.M. with their network of European services and, more important still, their Far Eastern service. For the last two or three years this company's service to India and the East has been the fastest one, and when K.L.M. obtain their new fleet of machines to supersede the D.C.3s which are at present in use on the route other operators will need to look again to their laurels.

Much of Schiphol's excellence as an aerodrome is concerned with the fact that the area in which it is situated was under water until comparatively recently in history, and the result has been that there are large spaces all round the landing area on which no appreciable obstructions have been erected. Its size, therefore, even before the present extensions were put in hand, was effectively greater than many other aerodromes with longer measured runs. From the blind approach direction, for instance, it is possible to motor in for a very considerable distance at a height which need not exceed fifty metres, and the road which runs past the aerodrome on this boundary has no telegraph wires or other similar obstructions. Incidentally, a medium-wave approach system has been in use at Amsterdam since 1934, and only within the last few weeks has it been thought necessary to install Lorenz equipment for use on the same approach line. This new equipment has been put in, not because the original system was in any way unsatisfactory, but because the ultra-short-wave method has been virtually standardised for European operations. Many of the machines in the fleet have been or are being modified so that the medium-wave approach indicator already on the dashboard can be used alternatively with ultra-short-wave receivers.

The fact that the medium-wave equipment has been available removed the necessity for a "ZZ" D/F layout, but, in addition to a loop system in the control tower, the direction-finding equipment at Schiphol includes also a long-range Adcock station lying a little more than a kilometre to the south. The transmitting aerials are nearly three kilometres away from the aerodrome in a north-westerly direction. In common with the usual European practice, Schiphol has a bad-weather controlled zone with a radius of twenty-five kilometres and one of the two D/F radio sets is reserved for use in QBI conditions. This equipment works on 932 metres, while the normal long-range equipment operates on 893 metres.

Dual Control

Traffic control methods might be thought to be slightly involved by the fact that the airport is municipally owned and controlled, while the radio services are owned and operated by the Government. The position, however, is no more difficult than in the case of any municipal aerodrome in England with Air Ministry control officers and radio operators and a municipally appointed manager. At any rate, everything appears to work very smoothly between the Government radio and meteorological services, the municipal traffic control officers and "harbourmaster," and the different K.L.M. departments.

At the present time eight fixed floodlights are used for night operations, but it is probable that when the runways have been completed the floodlighting will give place to a modernised version of the old flare-path system, with flush lighting in different colours to indicate to the pilot the amount of runway still left ahead of him during a take-off or landing.

To me the most interesting points in the K.L.M. organisation concern the operational methods and the training of the pilots. To those in this country who are accustomed to the idea of pilots carrying out their own training at very considerable cost up to, and well beyond, the "B" licence standard before any air transport company will consider their application, Holland will appear to be something of a Utopia. There the Government and K.L.M.

Part of the school equipment for prospective K.L.M. pilots is the now well-known Link ground trainer, shown here with the instructor and pupils watching the progress of the recording "crab."

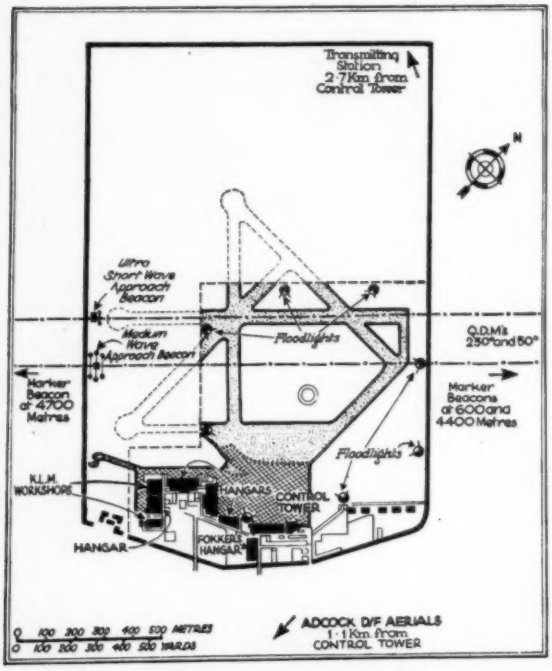
between them train selected young men at an all-in cost of 1,000 guilders, which works out at something rather less than £100. The training is, of course, concerned also with the establishment of a suitable military and naval reserve, and the pupils, after study on the aviation side of the marine navigation school in Amsterdam, and after training at the Nationale Luchtvaart School up to a standard well beyond our own "A" licence, spend a year with the Services before finally joining K.L.M. Actually the initial fee is 2,000 guilders, but half of this is refunded if the pupil is passed out for reserve training.

The machines used by the school are Panders, Koolhoven FK46s and 41s and a D.H. Leopard Moth. During the second preliminary training year the pupils spend two days a week on flying training and the rest of the time on theory, and it is interesting to know that among the present batch of pupils is Mr. Plesman, Jun., the son of the K.L.M. managing director. After the period of reserve work the pupils are examined for the equivalent of our "B," second-class navigator's and radio licences, while at the same time carrying out practrical advanced flying training on such machines as the twin-engined Koolhoven and the one and only Werkspoor Jumbo freighter, which has the particular virtue, so far as blind-flying training is concerned, of instability in all axes. Thereafter, the newcomers travel as co-pilots and engineers on the European and Far Eastern routes while, in the intervals, obtaining dual instruction on D.C.2s and, later, D.C.3s. In due course they are permitted to take charge of D.C.2s on internal services during the summer months, and so graduate eventually, after perhaps four or five years, to a first pilot's seat on the more serious year-round day and night runs.

In the flying superintendent's department a very complete and easily investigated file is kept, this explaining the progress and experience of every pilot in the service, or in preparation for service, so that it is possible to arrange the personnel for different jobs of work with ease and precision. A member of the staff of the same department has more recently produced a special loose-leaf "information" volume which is carried in every machine. This book provides, under a dozen headings, the most complete and easily looked-up mass of information that it is possible to imagine. A pilot, however new to a service and however he may have been forced by bad weather or from some other cause to search for another landing place by day or by night, can instantly find all the facts he requires under the appropriate heading in this book. Radio details, night flying information, emergency or alternative landing grounds, circuit rules in different countries, corridors, prohibited areas and international regulations of all kinds are to be found in it. As details change from month to month alterations are made, or new sheets inserted, by the operational staff.

The control tower at Schiphol, a photograph obviously taken during the ubiquitous "visibility 3 minus" conditions. The English translation below the word "Amsterdam" suggests something of the international character of the airport.

(Below) The new runways in process of development. The preliminary runway plan, which can be seen in the drawing at the foot of this page, has now been completed. The terminal buildings are in the centre of the background, while on the right are the K.L.M. maintenance shops.

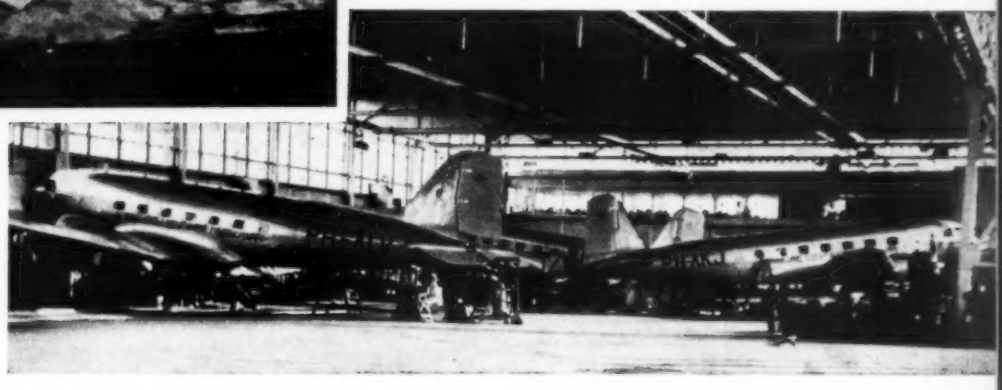


During their off-duty hours the flying staff of K.L.M. have the use of a rest-house which was originally a farmhouse. Here there are the customary reading rooms, billiards tables, and so forth, while there is a gymnasium close by.

Although they may be called maintenance shops, the K.L.M. servicing quarters are on such a large scale and carry out so much experimental and modification work that they ought really to be called the K.L.M. factory—and a factory, furthermore, which manufactures not only aircraft but also radio equipment and instruments. The company's engineers are continually modifying various items of equipment in order to make these even more suitable for transport flying conditions, and every week some new or comparatively new device is being tested in service. Among the more interesting developments which have been dealt with during recent months are different types of feathering airscrew and at least one new type of automatic pilot. It would be impossible to detail the

modifications which have been carried out during the past year alone, and reports on all such matters are duly sent to any interested manufacturers and operators.

K.L.M. have the distinct virtue of international-mindedness, and they are ready to use any piece of machine or equipment, wherever it may be made, so long as this appears to them to be an advance on anything which they may at present have in service. There are certain advantages in having comparatively little home industry, support to which must usually be given at any cost to efficiency. At the present moment, for instance, a batch of Lockheed Fourteens have definitely been ordered by K.L.M. and the associated K.N.I.L.M., but for the still larger machines which will eventually be put on the Far Eastern line the company may yet go to Germany (whisper the words Ju.90), though the consensus of opinion is that D.C.4s, or, perhaps, the big Boeings, will be used. Unfortunately, much as they admire our Empire boat, they have never considered the use of such a class.



On the right is a photograph of the general maintenance shops, one of many devoted to different items of equipment. The machine on the left of the picture will be recognised as one of the D.C.3s used by K.L.M. on their Batavia service

It was only three years ago that the technical department of K.L.M. was transferred from Rotterdam, so the staff concerned had a chance of laying out the shops at Schiphol as they really wanted them and in such a manner that no extensions would be necessary for a number of years. The result, of course, has been that the shops could be expected to be among the most up to date in the world, and at present there is still plenty of room.

The engine shops, in particular, have been laid out so that there can be no possible hitch in the progress of each unit. Units enter the dismantling department, which carries all the necessary special tools, and the parts proceed thence to the cleaning shop and the inspection department on special trolleys in which each engine part has its own place. There is a special department for the overhaul and inspection of such components as magnetos, carburettors, pumps and so forth, with a small paint-room immediately behind it. The parts are repaired and sub-assembled in the main hall which runs down the centre of the building, after which they are again inspected and carried on trolleys to one of five assembly bays where special jigs are used so that all the pipe lines, connections and so forth may be prepared so that they may later be attached without delay. From here the complete engines are taken to the test shop, which is well away from the building and is surrounded by an earth mound which effectively prevents the noise from reaching the offices.

All-metal airscrews and, in particular, those which are of the variable-pitch or constant-speed type, demand very careful maintenance, and K.L.M. have themselves developed two or three devices for such purposes as balancing and pitch-adjustment. Needless to say, the slightest crack in the duralumin is always liable to spread, and most careful measures are taken to protect these cracks and afterwards to remove the surrounding metal—a job which must still be done by hand. Airscrews of different types are, in fact, sent to these shops for attention from all over Europe.

The Radio Section

Basically of Philips design and manufacture, the radio equipment carried by the machines has been largely redesigned to suit special circumstances, and the radio experimental department has developed a number of interesting devices, including such things as pre-set wavelength controls, and simplified control arrangements generally. At present this department is hard at work on ultra-short-wave receivers, and it should be mentioned here that K.L.M., in common with Imperial Airways, use short waves for their long-distance communications on the Far Eastern run; in fact, Schiphol is often in communication with machines on the other side of the earth.

The majority of the instruments used in the machines are, of course, of American manufacture, but there are quite a number of German and English items among them, and the personnel of the instrument maintenance shop must be experimental scientists rather than mechanics. This shop is probably the largest and best equipped of its kind outside those of the manufacturers themselves. A complete range of test plant is necessarily carried, including, again, many items developed by the company for specialised purposes. The extensive use of free gyro instruments demands absolute precision and the most careful scrutiny in the testing of parts. In fact, it has been found possible to permit automatic pilots to run without dismantling for inspection for as long as 800 hours on European routes, and this equipment is not, except in the case of a major overhaul, taken out of the

Ground instruction : A group of future K.L.M. pilots with one of the Panders used by the National Flying School.

machines unless a pilot complains of inaccuracy or of some difficulty. On the Far Eastern route, however, where the apparatus is working under much more stringent conditions, the gyroscopic instruments and the automatic pilot in particular are removed and inspected after every out-and-home run.

The actual airframe maintenance shop is, of course, the largest of them all, but when I was in Amsterdam only two or three machines were being dealt with. The equipment is designed for the most part for work on D.C.2s and D.C.3s, and most of it is from the Douglas factory. In fact, the present-day stressed-skin machine requires inspection rather than maintenance, and if there is any major damage or failure new sections must be fitted. Needless to say, there is an ample supply of spare parts for urgent needs.

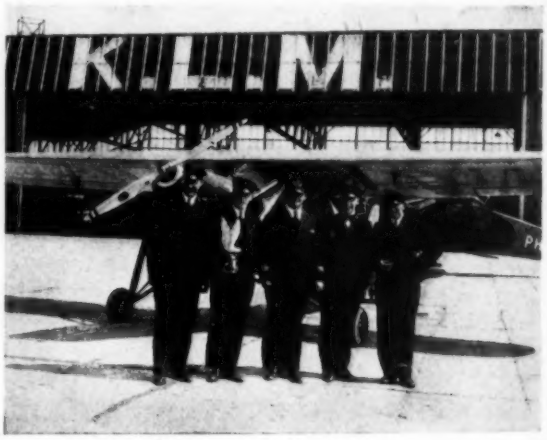
The entire organisation of the K.L.M. shops gives one an idea of what can be done by efficiency without the necessity for dragooning, though it is a significant fact that practically everybody on the operational side is a fully qualified commercial pilot and everybody in the specialised maintenance department is comprehensively trained. At the present moment they have an engineer permanently stationed in America, in addition to a pilot who carries out acceptance tests of new machines and makes reports on new types as they appear.

* * *

On the way back to Croydon I was lucky enough to be given the chance of riding "up front" in a D.C.3. Unfortunately (or fortunately) the weather was extremely good, and any tolerably efficient novice pilot could have made his way from Amsterdam to Croydon on a compass and an air-speed indicator. However, it was interesting to see how the Sperry automatic pilot is used from the moment when the machine reaches operating height, or even before, and how it is kept in action until the final aerodrome circuit.

With constant-speed airscrews the pilot must, of course, carry a power-output and boost chart so that he can see at a glance how his controls should be set and his instruments should read for maximum economy. On this comparatively short trip the actual operating height is a matter of 2,000 metres. These charts are in three sections, each one covering the pressures and so forth at a different revolution indication—the three engine speeds being, in fact, 1,800, 1,900 and 2,000 r.p.m. for the Cyclones.

The D.C.3s carry their own D/F loop, and the new Croydon omni-directional beacon is, consequently, of considerable value. On this trip, with the prevailing good weather and with a pilot who knew the route so well, radio communication was practically reduced to mere reports of position, departure and respective times of arrival. Incidentally, the maps used by K.L.M. on their different services are carefully pieced together in one long strip with permanently drawn track-lines, and this complete strip map is fitted in a special case with rollers to enable the sections to be moved along as and when necessary. The fact that, in modern transport operations, the ground is rarely seen, does not prevent K.L.M. from providing their pilots with every means of assistance in simplest possible form.



Pupils and instructor, with trophy, in front of a Koolhoven—one of those used for training and charter work.

BEFORE AND AFTER THE CARBURETTOR

IT is not to be wondered that the name of Amal figures among the engine equipment of so many aircraft, for the list of items shows the wide application of the firm's products Fuel pumps, fuel pressure valves, jets, flame traps and thermometer oil pockets are a few of the aircraft components, while Amal jet-calibrating machines and flowmeters are familiar equipment in many works and on almost all test beds. The flame trap needs no introduction, although it should be noted that there is a considerable number of models of different sizes, depending upon the engine power and which position the trap occupies, e.g., whether between carburettor and cylinders or whether on one or other side of a supercharger.

Five types of Amal fuel pumps are produced. The 136 and 160 are duplex pumps, each with two independent diaphragms operated by a single cam. The type 140 is a single pump which has as large a delivery as the duplex pumps, while the 120 and 150 are smaller capacity single pumps. The same principle is employed in every case and a filter is placed at the bottom of each quickly removable sump. Levers are supplied for hand priming the engine without having to turn it. On the suction stroke of the pump the diaphragm spindle is lifted by the cam through a rocker and returned by a spring according to the delivery pressure. For the two single non-return valves no springs are used; a metal disc is placed over the filter on the inlet side and a ball valve on the delivery side.

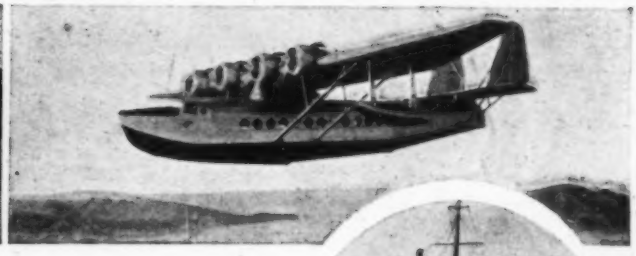
To be placed between carburettor and fuel source, the Amal fuel pressure regulator has steel valves and seats and a light alloy casing. The usual outlet pressure is 1.8 lb./sq. in. and the feed pressure can vary between 4 and 10 lb./sq. in.

A new type fuel filter is in production to Air Ministry specification and is capable of dealing with 100 gallons per hour. The gauze area is 11.7 sq. in., and the weight is between 18½ and 19½oz. The sump (of which two sizes are available) and the body are made of anodised L.33 light alloy; the outside of these filters is finished in black enamel. The sump is simply removed by lifting a locking strip, loosening a wing nut and swinging the clamp bar downwards.

A simple but effective small part is the thermometer oil pocket. Stratification of oil, which has often been the cause of incorrect readings, is prevented by the design of the inside sleeve.

An Amal product which is in wide use is the flowmeter, and in the same class the jet-calibrating machine. Several forms of each of these two are available and have application in several industries other than those with which we are concerned. For example, calibrations for gas jets can be simply effected by using petrol in the calibrator and obtaining the reading from standard conversion tables. Amal also produce calibrated jets.

Among further products of the Holford Works (Perry Barr, Birmingham, 20) are carburettors for the Napier Sea Lion engine—a unit almost identical with the Lion—for high-speed marine craft



WORLD AIR ROUTES

Mr. Galpin Looks at the Wood Instead of the Trees : The "Mid-World" Route of the Future

TO those who are submerged in details in the course of their work there is always a risk that after many years they may develop a tendency to look at the trees so intently that they fail to see the wood. In the paper which he read before the Royal Society of Arts on Wednesday of last week, Mr. C. J. Galpin, Director of Overseas Civil Aviation, Air Ministry, kept his eyes firmly on the wood, and increased the appreciation of its significance by merely outlining the history of the trees of which the wood of world aviation is composed. The result was a very refreshing change, to which the lecturer's style contributed very materially.

Taking it as an axiom that a world route follows the line of least resistance and greatest profit, Mr. Galpin pointed out that the conditions which form its character are partly technical, partly political, partly economic, and sometimes even cultural. So the Roman road derived its character purely from military and economic considerations and was a straight line from point to point. The English road, on the other hand, portrayed by its meanderings a compromise between the needs of the community and the vested interests of the individuals whose estates it must skirt.

Based on this conception of the fundamental differences between the world air route and the "feeder lines" connecting with it, Mr. Galpin outlined briefly the existing long-distance air routes operated by Great Britain, France, Germany, America and Russia, and explained how they came into being and why they were located just where they are. These air routes will be familiar to readers of *Flight*, and this part of Mr. Galpin's paper may therefore be skipped. It is, however, of interest to quote his remarks concerning the Pacific air routes. After explaining the work that has already been done in the Pacific by Pan-American Airways, Mr. Galpin said: "It cannot be long before the American activity towards New Zealand provokes its response. Discussions are already on foot between the British Governments concerned, with a view to co-operation in the successful exploitation of this route. The interesting point about the Pacific route to New Zealand has been the sudden emergence of certain hitherto unwanted little islands into value and prominence. These islets, which are in effect little more than lagoons surrounded by a ring of coral, can become very satisfactory airports instead of continuing to offer the world no more than an occasional harvest of copra or guano."

Unpromising

Of the routes which "are appearing over the horizon" Mr. Galpin was not very hopeful, and he pointed out the difficulties connected with the north-about Pacific route from Canada across to Russia via Alaska and Siberia, the Russian direct route via the North Pole, and the direct route from Australia to Africa via Keeling Islands.

From air routes of to-day and those of the immediate future Mr. Galpin turned to those "which we middle-aged men are likely to see." The wholesale extension of flying all over the world was taken for granted. What the lecturer considered interesting was to consider whether this general activity is likely to be systematised, and if so, in what way.

Mr. Galpin thought that, short of some political catastrophe, the chief centres of technical activity would remain much as they are now. The routes at present laid down might be said to traverse the earth in the most practical way. The development of the transatlantic route had compelled us to study the means of achieving long-distance journeys without landing.

"... air travel is so serious a competitor to sea travel of the super class ... that it was questionable whether money should continue to be spent on this type of ship."

The results of successfully bridging 2,000 miles of ocean should be capable of application elsewhere, and he thought the present system of routes, which formed what might be termed the "ordinary service," might have superimposed upon it an "express" service, operating at 300 m.p.h. and over distances of 1,700 to 2,500 miles. It would then be practicable to lay out an express system of long hops in a kind of world network, binding the whole of the traffic system together by great junction alighting places specially designed for long-distance aircraft.

The lecturer showed a diagram of such an express system, which would give journeys of one day from England to South Africa, two days from England to Australia, 12 hours from London to New York, 8 hours across the American continent and less than 24 hours from England to South America. From the big junctions radiated slower services which were more economically run in small hops. No place would be more than 1,000 or 1,200 miles distant from a junction, say 8 or 10 hours' flying. Mr. Galpin thought the long-distance mails would be carried in special aircraft. By this means passenger aircraft would be released from the large bulk loads in which a small percentage difference amounted to a considerable actual weight, and would reserve themselves chiefly for their proper traffic, only distributing smaller loads of mail on local services from the main junction points of the express system.

Mid-World Route

Of the air routes at present in existence, or contemplated, Mr. Galpin suggested that there was almost completed a mid-world route which might survive and form the "autobahn" or chief trunk route of the future. Starting from Great Britain this runs to Canada and the United States, across the continent to Honolulu, thence to Hong Kong, across Indo-China to India, and back to Europe either through Persia and Turkey or through Egypt and across the Mediterranean. From this route radiate the great arterial services from Burma to Australia, from Egypt to South Africa, from Europe and North America to South America, and from Hong Kong to China and Japan.

Parallel to this route one might envisage a route from Europe across Russia, joining with Canada and thus back via Newfoundland to Great Britain; but Europe is divided laterally by physical barriers, and the lecturer felt that the one he had called the mid-world route was more likely to attract the traffic of rich and industrious areas.

One of the most interesting parts of Mr. Galpin's paper was that which dealt with the report of the United States Maritime Commission published last November. The Commission came to the conclusion that air travel is so serious a competitor to sea travel of the super class (*Queen Mary* and *Normandie*) that it is questionable whether money should continue to be spent on this type of ship. The Commission, Mr. Galpin said, had not been content to take aircraft only as they exist to-day, but had also referred their calculations to types of aircraft which

might be expected within a few years. They had taken a flying boat of about 100,000 lb. gross weight and carrying 40 passengers over distances comparable with the Atlantic, and also a flying boat weighing 250,000 lb. and carrying 150 passengers over a similar distance.

The Commission, the lecturer pointed out, had drawn a comparison between the power required to convey one passenger across the Atlantic by super-liner, by flying boat, and by airship. The flying boat of the immediate future was already at a slight advantage over the airship, and very considerably over the super-liner, while the 150-passenger flying boat of the future was still more remarkable in its efficiency.

"There are," Mr. Galpin continued, "other calculations in the report which may well lead the American public and our own to consider seriously whether the amount of money spent on the building of aircraft is sufficient in relation to the relative conditions which development has to offer."

"Rivalry without Enmity".

In conclusion, the lecturer said: "No one who views the prospect of a world-wide system of air routes with enthusiasm can keep from feeling that an essential condition of its realisation is a larger measure of co-operation between people who are now competing. Those who have studied the history of the steamship and railway services will admit that the policy of individualism and isolation was one that brought bitter lessons. It would be a mistake not to learn from that experience, and we are bound to confess that unregulated competition will in the end lead us nowhere. . . . The time may soon come when the principle of freedom of the air will be found worth while, not only politically but also commercially. In a form of transport so essentially and naturally international as aviation, international advantages must eventually persist over those which are purely national; and while I would not advocate the ideal of a world-wide, regimented uniformity, we would all welcome the advent of an active and vigorous corporate system, the qualities of which were rivalry without enmity and combination without complacency.

"It is impossible to end such a paper as this without asking what part our own country should play in such a future. Those who study present activities in the United States see a great new effort to press American equipment, American services and American ideas forward in all parts of the world. Consider the specification for an aircraft which Pan-American Airways—the only United States air line at the present time which specialises in international oversea traffic—has sent out to a number of the best manufacturers of aircraft in the United States.

"The machine must carry 100 passengers with a crew of 16, and considerable quantities of mail, baggage and freight, over a range of 5,000 miles at a cruising speed of 200 miles an hour. The passengers must have comfortable accommodation, including dressing and dining rooms. It is to be counted an advantage if the aircraft is capable of operating at altitudes of about 20,000 feet without discomfort to the passengers; that is to say, that the hull must be airtight and the interior air pressure artificially maintained in the rarefied atmosphere of high altitudes.

"We must look to our own effort in this matter. It is not enough to pour out money. That is only the start. Research must go forward, machines be designed and built, men trained. We would like to see British air lines manned by our men and equipped with our aircraft, carrying the British style and standards of public service all over the world. It is foolish to belittle what has already been done, or to disparage the effort which is now being made. But it is equally foolish to talk of 'leeway' and not to make it up, even if this demands still sterner effort on our part. It seems to me that our country is called upon to make its fair contribution, having regard to its wealth and its traditions, to the peace and welfare of the world by means of civil aviation; to take a leading and not a following place in international air traffic. It is a great thing to defend peace, but better still to enrich her as well. I believe that we have between us the skill and the power and the resources and the genius to do both, if we will."

TIGER MOTHS—with LIDS

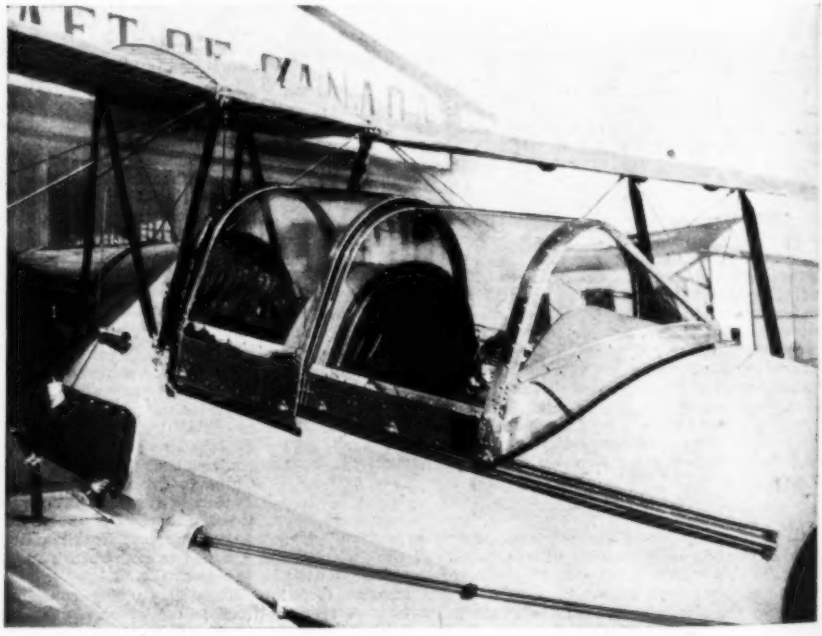
LACKING the "afterthought" appearance of many such affairs, a neat transparent cockpit cover is the most noticeable feature of the Tiger Moths now being built for the Royal Canadian Air Force at the De Havilland factory at Toronto.

The first machine in the batch of twenty-five was test flown in late December, and before the spring break-up the whole series should be delivered.

Several interesting detail modifications have been introduced to suit Canadian conditions. The Tigers have interchangeable wheel, ski or float chassis, and must operate as efficiently and conveniently in the severest cold of winter as in the heat of summer.

The sliding coupé top affords cabin protection without restricting vision or ease of exit, and incorporates an instantly operative blind-flying. The instrument panels cater for all primary and blind-flying instruction and are covered with moulded rubber pads to give facial protection in minor accidents. The special R.C.A.F. fighting harness is fitted in both cockpits. Trim has to cover all conditions of summer and winter operation and a differential spring loading on the elevator control affords a comfortable longitudinal trim, thumb-operated ratchet levers being provided in both cockpits for trimming the tail.

The ventilation system supplies heated air to the cockpits in winter or cool air in summer, and another special winter provision consists of quickly attachable masks and covers to reduce the amount of engine cooling and oil-tank cooling.



The enclosed cockpits of one of the Canadian-built Tiger Moths. The protective rubber covering for the instrument panel, and the "jacket" for the oil tank, are among the noticeable features.

For convenient maintenance, particularly in seaplane use, a three-piece engine cowling similar to that used on the Dragonfly has been adopted. The tanks have quick-acting bayonet filler caps and there is a special cap to expedite oil draining in winter. A pressure-type fire extinguisher in the engine bay may be operated from either cockpit or from outside the aircraft.

The Canadian D.H. plant, and the buildings on the company's aerodrome adjoining, have recently been extended.

At the Air Registration Board's first staff dinner. Very interesting and amusing speeches were made by Mr. T. R. Thomas, secretary of the A.R.B.; Sir Maurice Denny, chairman; Mr. J. Norman, principal surveyor; Sir James Ross, of the Air Ministry; Mr. Graham Mackinnon, Mr. H. H. Greig and Mr. F. Handley Page. Represented on the A.R.B. are constructional, operational and insurance interests. Certain long faces are attributable to lens distortion rather than apprehension of the future.

AIR REGISTRATION BOARD CELEBRATES

Speakers at the First Annual Dinner Describe the Birth and Work of the New Body Formed to Govern Civil Aviation

GOOD will on all sides and a determination to succeed characterised the first annual staff dinner of the Air Registration Board, held at the Hotel Victoria, London, last Thursday. Numerous members of the aircraft industry were present, as well as many representatives of the operating companies and the Air Ministry. The dinner, which had been organised by Mr. T. R. Thomas, the secretary of the Air Registration Board, was, in fact, a great success in every way. In view of the fact that the Board will in future take over most of the functions hitherto performed by sections of the Air Ministry in relation to civil aircraft up to ten-seater capacity, the event may be regarded as something of an historic occasion. One may say that it marks the beginning of self-government as far as civil aircraft up to medium size is concerned; and Mr. Handley Page, among others, stressed the fact and pointed out that the people who had been elected to the Board were well qualified to see that the prestige of British aircraft did not suffer.

The chairman of the evening was Mr. T. R. Thomas, who, in proposing the toast of the Air Registration Board, gave a brief outline of its history. The first recommendation for the renewal of the Certificate of Airworthiness was made nearly nine years ago by the Aviation Committee of the British Corporation, the chairman of which was Sir Maurice Denny. That survey was carried out by Mr. James Norman, who was now the Board's principal surveyor. With that the ice had been broken, and Lloyd's Aircraft Register followed shortly after. This and the Shipping Register, under the fatherly eye of Col. Outram, recommended the renewal of many C. of A.s of the smaller type of aircraft. He recalled that ultimately the two Registers joined forces and, under the title of Joint Committee, dealt with over 900 renewals in 1936.

That Postprandial Oratory

In the meantime, continued Mr. Thomas, the postprandial oratory of Mr. Handley Page was having its effect, and in 1931 a Government Committee was set up under the chairmanship of Lord Gorell to examine and report on the position of civil airworthiness and the desirability of modifying the arrangements then in force. In 1933 the Gorell Committee recommended that control of airworthiness should devolve on a Board consisting of representatives of operators, constructors and insurers. The Secretary of State for Air accepted this recommendation subject to the submission of a scheme which was financially and technically practical—and then the fun began.

A drafting committee was set up to evolve the scheme. The chairman of that committee was Mr. Handley Page, who supplied the driving force, and by dint of his persuasion, bullying and blarney the Committee was able, in 1936, to put before the Air Ministry a scheme which they considered met the requirements of the Gorell Report.

The next step was to examine, in collaboration with a Committee under Sir James Ross, just how such a scheme could be put into practice. When the drafting committee had squeezed as much money as possible out of the Air Ministry, and a balance out of operators, constructors and insurers, the Committee passed its scheme over to Sir Francis Shelmerdine, the Director-General of Civil Aviation.

By this time all parties were fairly well satisfied that it was possible to establish a body, which, by reason of its own interest in airworthiness, could best control it; and the necessary powers to establish such a body were taken in the Air Navigation Act of 1936. The Secretary of State for Air agreed that it would be desirable to have two additional interests on the Board, those of the general public and of the commercial air pilot. The Board was fortunate in having representatives of these two interests, Sir Laurence Philipps and Capt. Stocken. The drafting committee was also fortunate in having two eminent members of the legal profession, Mr. Guy F. Johnson, the present treasurer of the Board, and Mr. C. V. Allen. These gentlemen drew up the articles of association.

Greetings from Egypt

Mr. Thomas then paid a tribute to the chairman of the Board, Sir Maurice Denny. He went on to regret the absence of Mr. A. J. Whittall, a vice-chairman, who was recovering from an operation; of Mr. Woods Humphery, who had left these shores and was presumed to be seeking fresh oceans to conquer; and of Sir Laurence Philipps, who had preferred the sunshine of the South of France to Februarying in England. He concluded by reading a message from Capt. Lamplugh (who was on a health trip by flying boat to Alexandria) and Mr. Goodban, who had just established an office of the Board in Egypt: "Egyptian representatives send greetings and best wishes for successful evening. Allah be praised. (Signed) Mustapha Lamplugh and Mohammed Goodban."

In responding to the toast of the A.R.B., Sir Maurice Denny, Bt., C.B.E., said that the Board was not really quite one year old yet, as it began operations on April 1, 1937. He thought the date was a good one! It was their purpose

to ensure that the standards of design and construction were kept at the high level at which they had been before the Board took over.

Sir Maurice pointed out that originally the Board took over renewals for Certificates of Airworthiness for all types of civil aircraft. They also took over examination for ground engineers' licences, and he expressed the thanks of the Board to the De Havilland, Chelsea and Hamble schools for their co-operation, which he hoped would continue. The Board also issued Certificates of Airworthiness for subsequently modified aircraft. During the time the Board had been in existence many surveys had been carried out for underwriters.

There were offices at Croydon, Glasgow, Hatfield, Heston, Liverpool and Southampton, while new offices were being established as far afield as Alexandria and Singapore. They hoped in time to set up the necessary machinery for being able to issue Certificates of Airworthiness in all parts of the world.

He recalled that so far the Board dealt with aircraft up to ten passengers. He thought that aircraft constructors should consider very carefully whether or not it was worth while to take advantage of this division of aircraft. He was personally a little dubious about the wisdom of withdrawing all supervision. He was not sure that constructors, in their own interests, ought to do so, and pointed out that ship owners were not compelled to class their ships, but most of them did. If they did not they had to comply with certain points of law imposed by the Board of Trade. Yacht owners, for instance, found it an advantage to class their yachts, because doing so helped them to sell them afterwards. He personally would like to encourage constructors to submit to inspection for Certificates of Airworthiness.

Co-operation

Mr. James Norman, principal surveyor to the Board, proposed the toast of the guests. He expressed the hope that the relations of the Board with the industry would always be happy. To the operators he would say, "Co-operate with the Board—let us know your grievances."

Sir James Ross, K.B.E., C.B., said he was glad to respond on behalf of the Air Ministry. The Ministry would do all it could to help the Board. He recalled that in 1925 the idea of giving self-government to aircraft constructors and operators hardly seemed possible. At the Ministry they were very much in doubt about the feasibility of it. By 1932, however, they were getting closer and closer together, like people working in a tunnel from opposite ends. In the Air Ministry they could hear the pneumatic drills worked by Mr. Handley Page. Ultimately, the partition was cut through and they met and shook hands. Concerning the solution of the financial difficulties, it was difficult for him to express sufficiently eloquently their appreciation of the helpfulness of the D.C.A., Sir Francis Shelmerdine. [The Air Ministry has agreed to pay four-fifths of the cost of the Air Registration Board, the other one-fifth being divided between constructors, operators and insurers.]

Mr. Graham Mackinnon, responding for the insurance interests, said he had had only one thirty-second share in the formation of the Board. Lloyd's, the British Corporation and the Air Ministry had co-operated in making the Board possible. Contrary to popular belief, underwriters did not mind claims. In fact, they lived on them, but the claims must not be out of proportion to premiums, and they welcomed a standard like the Certificate of Airworthiness to formulate their ideas of the size of premium. Underwriters were passing on their collective knowledge. One department he would like to see established was something on the lines of Martlesham.

He rather feared that such things as controllability and stability were likely to be overlooked. An establishment something like that at Martlesham would ensure that they were not thus overlooked.

Operators' Views

Mr. H. H. Greig replied, in the absence of Mr. G. P. Olley, on behalf of operators. One year ago they were dealing with the Air Ministry and things went smoothly. Then the A.R.B. came along, and the operators wondered. Actually they could not wish for better people to work with. They had found the Board very helpful, and one thing that had pleased him was that they did not have to wait for a decision. He did not think anyone need worry whether an aircraft had fewer or more than ten seats. The work of supervising its construction was done equally well in both divisions.

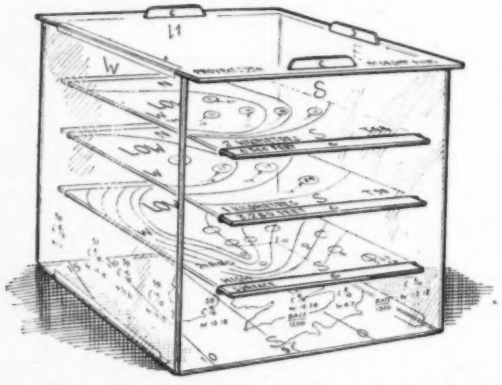
Mr. F. Handley Page said that on an occasion like this their minds must inevitably go back to Lloyd's coffee house. They were meeting that evening for the first time over the modern equivalent of the beginning of Lloyd's. They were beginning something, the ends of which could not be foreseen. They had moved away from intimate Government control and were enjoying the fruits of liberty, because the Government realised that they were able to control themselves without misuse of that liberty. The Air Ministry had seen that the people who were interested in the economic aspect of civil aviation were the right people to carry out the work of the Board.

Mr. Handley Page paid a warm tribute to the work of Mr. Thomas during the formation and organisation of the Board. Mr. James Norman had set up a good standard to which they should work, and now that they had obtained the services of Dr. Roxbee Cox the design end would be well looked after. They were also indebted to Lord Swinton for making the Board possible. It was he who put the Bill through Parliament. Finally, he said, the Board was conscious of the burden put on it, and it was up to them to see that the foundations were well and truly laid. They owed a great deal to the chairman, who had made this possible by giving so much of his very valuable time to the work.

THREE-DIMENSIONAL METEOROLOGY

NOW that transport flying, at least of the long distance variety, is being carried out at fairly considerable altitudes, the study of meteorological conditions, and particularly those concerning the upper air, is becoming increasingly important.

The Bartlett Weather Service, of 6, Racquet Court, Fleet Street, London, E.C.4, has recently developed an interesting device by which the weather maps at different altitudes may be easily studied in relation to one another. This device consists of a transparent box in which the different maps, also drawn on transparent sheets, take the form of shelves. On the base of the box is drawn a map of the area covered, and within reason the number of shelves need not, of course, be limited. The entire affair is collapsible, and can be folded when not in use into a rectangle of about 6in. × 6in. × ¼in.



For keeping deep depressions in captivity: The Bartlett three-dimensional weather map for various altitudes. When the shelves have been removed the top may be lifted and the device folded into a conveniently flat shape.

The maps are traced in Indian ink from a basic sketch made in the usual way from the reports obtained, and there is no reason why the different layers should not be drawn in different colours in order that they may be easily distinguishable from one another. The examples so far made by Mr. Bartlett have been of the three-tier variety, the lower shelf indicating surface conditions, the middle shelf those at 1,000 metres and the top shelf at 2,000 metres. Any other necessary information may be written on the sides of the box and the ink can be washed off very easily.

This three-dimensional weather map should be particularly useful in training schools, apart from its value at control centres, where the day's "picture" may be looked at by pilots.

Astigmatics ?

"Night Hawk," by J. Railton Holden; 7s. 6d.; Newnes.

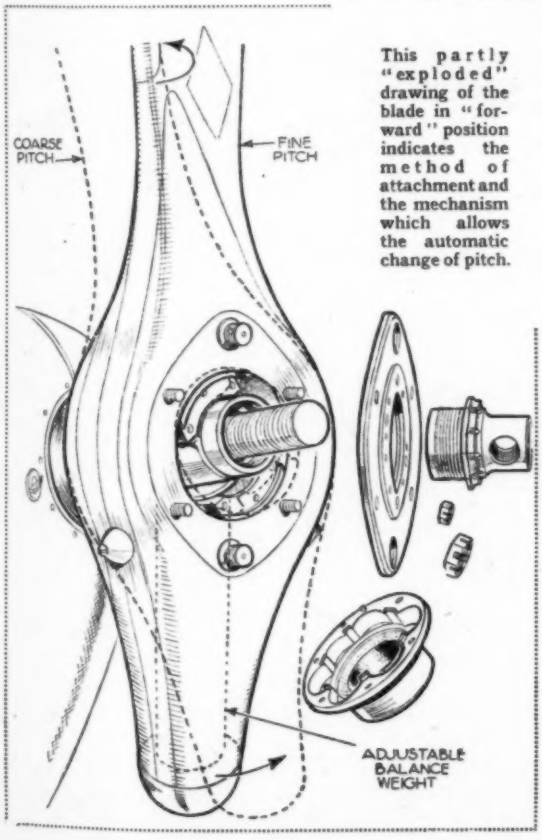
HARD flyin', hard shootin', and hard drinkin' on the U.S.-Canadian border. The eyes of the Lady in the Case were " . . twin automatics blazing eternal obliteration at everyone connected with the force." But this book touches on much more than the optical armament of fair females; particularly gun-running under the auspices of a master mind called, as the reader may have guessed, The Ghost.

The AMPUTATED AIRSCREW

A Demonstration of the Everel Single-blade Design : How It Works

FROM time to time *Flight* has made mention of the Everel single-blade airscrew produced in Baltimore, U.S.A. So far only small sizes are being produced, but blades suitable for absorbing up to 1,500 h.p. are in mind and certain very large examples are already on test in America. One of these airscrews was demonstrated for the first time in this country last Friday. A Taylor Cub so fitted made demonstration flights at Hanworth, and to allow a comparison of performance with the Everel airscrew and with a normal two-blade wooden one, two Cubs were taken off starting side by side.

The claims for a material increase in efficiency for a single-blade airscrew would appear to be justified, for the take-off of the Cub, which, for the horse-power, is in any case good, was considerably improved. As the throttle of the Everel-equipped machine was opened the tail lifted and it left the ground in little more than 50 yards, at once climbing steeply ; the second Cub took off with between 30 and 40 yards more run. The two pilots appeared to give quite a fair and disinterested comparison.



This partly "exploded" drawing of the blade in "forward" position indicates the method of attachment and the mechanism which allows the automatic change of pitch.

"Flight" Photographs

Like most unorthodox pieces of machinery, the Everel airscrew looks a little uncouth until one becomes used to its appearance. In the picture at the top of the left-hand column is seen the take-off demonstration, with the Everel-fitted Cub nearest the camera ; both had left the same mark simultaneously.

In appearance the Everel airscrew is distinctly strange, and when, on pulling the tip, it appears to be carried on a universal joint one's curiosity increases. The inventor, Mr. Evert, conceived his single-blade airscrew first with a view to efficiency, for it is generally known that the disturbed air left behind one rotating blade causes the next of two, three or four to lose a lot of its efficiency. The effect is similar, aerodynamically, to the biplane interference found in wings.

Change of Pitch

Due to its attachment, the Everel airscrew is automatically "variable pitch" in effect. The tip of the blade will move in a forward and rearward direction about 3in., at the same time twisting to a fine or coarse pitch. An equilibrium is set up between (a), the force on the blade due to thrust tending to produce the fine-pitch position ; and (b) the centrifugal force to the hub assembly about the pivot tending to produce coarse pitch.

For purposes of take-off, in which the advantage is particularly marked, the airscrew must be in fine pitch. The throttle is opened to cruising r.p.m., and the load on the blade brings it forward to fine position ; and, therefore, the counterbalance weight is "backwards," or behind a vertical line taken at right angles to the crankshaft.

As the machine moves forward the thrust decreases a little and centrifugal force, acting against reduced thrust, produces a slightly coarser pitch. On flying level at cruising speed the thrust is still less and the blade is moved back until it is almost vertical and in coarse pitch. In a dive, the blade could reach a very coarse pitch position, trailing slightly rearwards with balance weight forward.

The construction of the airscrew follows normal wooden practice (cemented laminar) and the metal counterbalance is let into a bored-out stub. The weight is slightly more than that of the corresponding two-blade airscrew.

Considering the fact that it is quite simple and apparently justifies the performance claims made for it, i.e., much better take-off, higher speed (7 m.p.h. increase in Cub's cruising speed), and improved climb, the Everel airscrew appears to have considerable possibilities. With regard to maintenance we are told that the wear on the bearing after more than 3,000 hours could not be measured.

Mr. A. J. Walter, Taylor Cub distributor in this country and organiser for Friday's demonstration, is also an Everel distributor by reason of manufacturers' arrangements between the two companies. The programme of sales and manufacture of the airscrews in this country is in the hands of W. S. Shackleton, Ltd., 175, Piccadilly, London, W.1.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

A flight of R.A.A.F. Hawker Demons (R.R. Kestrel II) over Australia's new "streamlined" train.

Higher Appointments

THE Air Ministry announces the appointment of Air Vice-Marshal Hazelton Robson Nicholl, C.B.E., to be Air Officer Commanding, R.A.F., Middle East, with effect from a date in March, 1938, vice Air Vice-Marshal Cuthbert Trelawder Maclean, C.B., D.S.O., M.C., who will assume command of No. 2 (Bomber) Group.

A.V.-M. H. R. Nicholl, who was born in 1882, entered the R.F.C. as a 2nd Lieutenant in 1915, and his subsequent war service, for which he was awarded the O.B.E. and a French decoration, included the command of various squadrons.

He was granted a permanent commission in the R.A.F. in 1919 with the rank of Squadron Leader and, after employment on Air Staff Duties at various H.Q.s and at the Air Ministry, he passed a course at the Royal Naval College, Greenwich, in 1926. He commanded a Squadron in Iraq from 1926 to 1929, being awarded the C.B.E. in 1929 for services rendered in connection with the operations in the Southern Desert, Iraq, and subsequently he served successively as Deputy Director of Training, Deputy Director of Personal Services and Deputy Director of Manning at the Air Ministry before proceeding to command the Royal Air Force Base at Calshot in 1932. In March, 1934, he was appointed to command the Central Area, Air Defence of Great Britain, and since November, 1935, has been on the Special Duty List whilst serving with the Royal Australian Air Force.

He was promoted to Group Captain in 1929, to Air Commodore in 1933, and to his present rank in January, 1937.

A.V.-M. C. T. Maclean, who was born in 1886, was commissioned in the Royal Fusiliers Special Reserve as a 2nd Lieutenant in 1914, and in the following year was seconded to the R.F.C., having graduated at the C.F.S. In 1916 he was transferred from the Royal Fusiliers Special Reserve to the Royal Scots Fusiliers, and in 1919 was granted a permanent commission in the R.A.F. as a Wing Cdr. and resigned his regular Army Commission.

During the Great War A.V.-M. Maclean served in France, and in addition to receiving the D.S.O., the M.C., and a French decoration, was mentioned in despatches on three occasions. In 1920 he was posted to H.Q., Inland Area for Personal Staff Duties, and in 1922 proceeded to India for Air Staff Duties. Subsequently he commanded a F.T.S. at home, and units in Iraq and Egypt, and in 1929 he was appointed O.C., British Forces in Aden. In 1931, he was posted to the Air Ministry as Director of Postings, and since 1934 has been Air Officer Commanding, R.A.F., Middle East.

He was promoted to Group Captain in 1925, to Air Commodore in 1931, and to his present rank in January, 1935. He was appointed C.B. in the New Year Honours List, 1933.

Singapore Defence Exercises

MORE than a hundred aircraft took part in the combined exercises at Singapore last week. Included in the twenty-seven warships participating was the carrier *Eagle*.

The R.A.F units in the defending force were under the immediate command of Air Vice-Marshal A. W. Tedder, A.O.C. Far East Command, and comprised Nos. 36 and 100 (T.B.) Squadrons, Nos. 203, 205 and 230 (G.R.) Squadrons, and Nos. 84, 39 and 60 (Bomber) Squadrons, together with their attendant bomber transport aircraft and with the Straits Settlement Volunteer Air Force.

Move of Units to Dhibban

NOS. 1 and 2 Companies, Iraq Levies, closed at Hinaidi and reopened at Dhibban on January 2 and December 23 respectively.

Flying Training Schools

THE undermentioned officers and airmen have been awarded special assessments at Flying Training Schools:—

No. 3 F.T.S., South Cerney

Special Distinction: P/O. E. M. Ware. *Distinguished Pass*: P/O. J. H. Barrett, A.P/O.s W. S. Bowyer, F. J. Howell, T. M. W. Smith, G. H. Wherry.

No. 4 F.T.S., Abu Sueir

Special Distinction: P/O. E. W. Young, Sergts. Beale, R. C., and Coggins, J. *Distinguished Pass*: P/O. S. G. Stilling, A.P/O. R. J. Manton, Sergts. Major, K.A., Smith, E. G., Smith, R. A. H., and Stanley, J. F.

No. 10 F.T.S., Tern Hill

Distinguished Pass: A.P/O. R. B. Harris.

UNIT BADGES. The above designs, recently approved by His Majesty the King, are described by Chester Herald as follows :— No. 3 (Fighter) Sqn. : On a monolith a cockatrice ; No. 5 (Army Co-operation) Sqn. : A maple leaf ; No. 10 (Bomber) Sqn. : A winged arrow ; No. 46 (Fighter) Sqn. : Two arrowheads surmounted by a third all in bend ; No. 58 (Bomber) Sqn. : On a branch an owl.

Mail to No. 204 (G.R.) Squadron

PRIVATE correspondence by air mail for the personnel of No. 204 (G.R.) Squadron should be addressed "Australian Flight No. 204 (G.R.) Squadron, Royal Air Force," at the appropriate port of call. The latest date and time for posting unregistered air mail correspondence at the Head Post Office, London, to arrive at Adelaide on March 2, is February 12, before 8 p.m.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—F/O. Mervyn Seymour Bocquet lost his life in an accident which occurred at Uxbridge, Middlesex, on February 4, to an aircraft of No. 111 (F.) Squadron, Northolt, Ruislip, Middlesex. F/O. Bocquet was the pilot and sole occupant of the aircraft.

P/O. Alfred Alexander Devany lost his life in an accident which occurred near Brough, Yorkshire, on February 7, to an aircraft of No. 72 (Fighter) Squadron, Church Fenton, near Tadcaster, Yorkshire. P/O. Devany was sole occupant of the aircraft.

Air Force List

THE February issue of the *Air Force List* has now been published. It can be purchased (price 4s.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

New Scottish Aerodromes

NEW Service aerodromes are to be constructed near Kinloss and Lossiemouth, in Moray. A number of farms have been acquired, and it is understood that the two aerodromes will be of 445 and 500 acres respectively.

Award of Flight Cadetships

THE Air Ministry announces that Ex-Aircraft Apprentices C. Light, P. J. M. Nettleton, E. W. Padfield and C. Warren, from No. 1 School of Technical Training (Apprentices), Halton, and T. Thomas, from the Electrical and Wireless School, Cranwell, have been selected for cadetships at the Royal Air Force College, Cranwell, on the result of the examinations held on completion of their three years' training as aircraft apprentices.

The Viscount Wakefield Scholarships.—These scholarships, valued at £75 each, have been awarded to Flt. Cadet E. W. Padfield, from the ex-aircraft apprentices from No. 1 School of Technical Training (Apprentices), Halton, and to Flt. Cadet J. G. C. Salmond, son of the late Air Chief Marshal Sir W. G. H. Salmond, an open competition entrant.

The Hyde-Thomson Memorial Prize.—This prize, valued at approximately £29, has been awarded to Flt. Cadet T. Thomas, the ex-aircraft apprentice from the Electrical and Wireless School, Cranwell.

An Equipment Branch Reserve

A NEW branch of the Royal Air Force Volunteer Reserve is to be established to provide a reserve of equipment officers. That Branch provides the organisation for maintaining Air Force units of all types with the wide range of equipment and supplies which they require.

Candidates must be between their twenty-fifth and fortieth birthdays, be physically fit, and must have had not less than five years' business or industrial experience in the employment of one or more firms of standing. Recruitment will be limited, at present, to candidates who are able to attend in Central London for instruction, and enquiries should be sent to the Secretary, Air Ministry (S.7.e.), Kingsway, London, W.C.2.

The initial period of service is five years, and officers will have the opportunity of extending their service at the end of that period.

Training will take place, so far as possible, at times which do not conflict with the officers' civil employment. These courses will normally be held at the Royal Air Force Volunteer Reserve London Town Centre, Staffordshire House, Store Street, Tottenham Court Road, W.C.1, but as a temporary arrangement they will be held at the Air Ministry, Adastral House, Kingsway, W.C.2. Officers will be required to attend at times, so far as possible, convenient to themselves for twelve working days' continuous annual training at a R.A.F. unit. During this period of annual training and when officers are called up for R.A.F. service in an emergency, pay and allowances (where admissible) will be issued at the rates applicable to officers serving in the Equipment Branch of the regular Air Force. Provision will be made for the refund of reasonable travelling expenses incurred in connection with training generally, and an allowance will also be paid towards other out-of-pocket expenses incurred in connection with attendance for non-continuous training. Officers who have been confirmed in their appointment and have attended for the required training and have otherwise complied with the regulations will be eligible to receive a retaining fee of £15 at the end of each year of service. Officers will receive an initial outfit allowance of £25.

Royal Air Force Gazette

General Duties Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (February 1):—E. Coleman, D.F.M., J. S. Dewar, D. H. F. Barnett, G. R. Montgomery, C. E. Hartley, H. M. Pearson, L. F. Sinclair, G. D. Emms, O. I. Gilson, H. D. McGregor, E. A. Jones, P. G. Thomson, H. C. Parker, T. W. G. Eady, G. E. Sampson, N. A. Tait, R. W. P. Collings, G. N. E. Tindal-Carill-Worsley, C. V. Howes, H. L. Messiter, G. B. Keily, J. A. H. Louden, P. L. P. Marett. Flt. Lt. (Acting Sqn. Ldr.) F. H. A. Harrison (Supplementary List) (Capt., R.A.R.O.) is promoted to the rank of Squadron Leader (October 25, 1937); Flt. Lt. J. P. Domville, M.B.E. (Supplementary List) (Lt., R.A.R.O.) is promoted to the rank of Squadron Leader (January 1).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—P. H. Gibbings (January 6), F. D. Nugent (January 7), D. G. Stokes, E. E. Vielle, P. J. A. Riddell, J. E. Kirk, R. J. Burrough, R. C. F. Lister, C. L. Y. Wright (January 28).

Wing Cdr. W. E. G. Bryant, M.B.E., is granted the acting rank of Group Captain (unpaid) whilst employed as Air Attaché, Tokyo (January 30).

The following Flying Officers relinquish the acting rank of Flight Lieutenant (January 16):—A. R. Fane de Salis, F. M. Smith.

Flt. Lt. S. E. Mackenzie ceases to be seconded for service as Aide-de-Camp to the Governor of Northern Rhodesia (January 26).

Equipment Branch

Flt. Lt. J. F. Young, M.B.E., M.M., is promoted to the rank of Squadron Leader (February 1).

Accountant Branch

Flt. Lt. J. L. Armstrong is promoted to the rank of Squadron Leader (February 1).

Chaplains Branch

The following are granted short service commissions with the relative rank of Squadron Leader with effect from January 18:—The Rev. C. W. A. Noble, B.A.; the Rev. C. E. Warrington.

Royal Air Force Reserve

Reserve of Air Force Officers
General Duties Branch

The following are granted commissions as Flight Lieutenants in Class C with effect from the dates stated:—J. G. Argles (November 1, 1936); Capt. B. Hobson, M.B.E. (R.A.R.O.) (December 13, 1937).

F/O. H. J. Forster is granted the honorary rank of Flight Lieutenant (December 10, 1937).

The following relinquishes his commission on appointment to

MORE BADGES: No. 87 (Fighter) Sqn.: A serpent reversed head reguardant and tail embowed; No. 99 (Bomber) Sqn.: A puma salient; No. 142 (Bomber) Sqn.: A winged sphinx; No. 608 (North Riding) (Fighter) Sqn.: A falcon's leg, brased, belled and jessed; Royal Air Force Staff College: A hawk close.

STILL MORE BADGES : No. 10 Flying Training School : On a terrestrial globe a star of four points throughout ; No. 8 Flying Training School : In front of two keys in saltire and a claymore erect, a rose ; School of Physical Training : A roebuck ; Royal Air Force Station, Gosport : A gannet ; Aircraft Depot, India : In front of a rising sun a phœnix.

a commission in the Royal Air Force Volunteer Reserve (January 1):—Flt. Lt. E. R. Meads.

Royal Air Force Volunteer Reserve

General Duties Branch

The following is granted a commission in the rank stated with effect from January 1 and with seniority of the date stated:—Flt. Lt. E. R. Meads (October 2, 1935).

Equipment Branch

Capt. W. J. Marshall (Royal Corps of Signals, Ret.) is granted a commission as Flight Lieutenant (December 20, 1937); Maj. E. A. Palmer, M.C. (Royal Artillery, Ret.) relinquishes his commission on cessation of duty (January 6).

Royal Air Force Appointments

General Duties Branch

Group Captain.—D. F. Stevenson, D.S.O., O.B.E., M.C., to Directorate of Intelligence, Air Ministry; for duty as Deputy Director of Operations, 4.1.38.

Wing Commanders.—A. P. M. Sanders, to R.A.F. Staff College, Andover; for duty as Instructor, 10.1.38. S. F. Vincent, A.F.C., to Directorate of Training, Air Ministry, 3.1.38. A. B. Ellwood, D.S.C., to R.A.F. Staff College, Andover; for duty as Instructor, 3.1.38. C. W. Hill, to No 217 (G.R.) Squadron, Tangmere; to command, 3.1.38. B. B. Caswell, to H.Q., No. 2 (Bomber) Group, Andover; for duty as Senior Personnel Staff Officer, 1.1.38. W. A. Coryton, M.V.O., D.F.C., to H.Q., No. 2 (Bomber) Group, Andover; for Air Staff duties, 1.1.38. C. N. Ellen, D.F.C., to H.Q., Training Command, Market Drayton; for Signals duties, 4.1.38. R. M. Foster, D.F.C., to Directorate of Operations and Intelligence, Air Ministry, 4.1.38. C. E. Maitland, D.F.C., A.F.C., to Directorate of Repair and Maintenance, Air Ministry, 3.1.38. E. I. Bussell, to H.Q., R.A.F., India, New Delhi; for Air Staff duties, 4.12.37.

Squadron Leaders.—W E. James, to H.Q., Coastal Command, Lee-on-the-Solent; for Engineer duties, 3.1.38. V. Rees, to Electrical and Wireless School, Cranwell; for Engineer duties, 29.12.37. T. C. Dickens, to H.Q., Coastal Command, Lee-on-the-Solent; for Personnel Staff duties, 29.12.37. E. H. Hooper, to Directorate of Equipment, Air Ministry, 3.1.38. J. W. Turton Jones, to H.Q., No. 12 (F.) Group, Hucknall; for Air Staff (Maintenance Liaison) duties, 1.1.38. V. B. Bennett, to H.Q., Bomber Command, Uxbridge; for Air Staff (Plans) duties, 4.1.38. J. W. Hutchins, to C.F.S., Upavon; for Engineer duties, 2.1.38 J. B. Fyfe, D.F.C., to No. 59 (A.C.) Squadron, Old Sarum; to Command, 3.1.38. J. B. Lynch, to H.M.S. *Glorious;* for Engineer duties, 4.1.38. H. J. G. E. Proud, to No. 5 (A.C.) Squadron, Chaklala, India; to command, 9.12.37. H. G. Wisher, to R.A.F. Station, Kalafrana, Malta; for flying duties, 20.12.37. J. W. F. Merer. to H.Q., No. 5 (B.) Group, Grantham; for Navigation duties, 15.1.38. R. B. Jordan, to Directorate of Organisation, Air Ministry, 15.1.38. I. J. Fitch, to Directorate of Signals, Air Ministry, 15.1.38.

Flight Lieutenants.—C. R. D. L. Lloyd, to R.A.F. College, Cranwell, 3.12.37. J. W. Young, to R.A.F. Station, Calshot, 4.12.37. R. Chadwick, to R.A.F. Station, Manston, 24.12.37. C. F. M. Rambaut, to No. 1 Air Armament School, Eastchurch, 3.1.38. D. Finlay, J. G. MacIntyre, D. J. Alvey, J. G. Davis, T. L. Moseley, P. E. Hadow, F. C. Richardson, J. B. P. Thomas, R. E. G. Brittain, C. R. Taylor, and P. B. Wood, to School of Air Navigation, Manston, 28.12.37. G. R. Brice, to No. 201 (G.R.) Squadron, Calshot, 10.1.38. E. A. Springall, to Special Duty List; on interchange duty with Royal Canadian Air Force, 14.1.38. W. R. Hartwright, H. B. Wrigley, and D. N. Kington-Blair-Oliphant, to H.M.S. *Glorious*, 8.1.38. J. H. Becher, to H.Q., R.A.F. Iraq, Dhibban, 8.1.38. V. L. Spendlove, to No. 2 (Indian Wing) Station, Risalpur, India, 9.12.37. O. W. Oliver, to H.Q., R.A.F., Mediterranean, Malta, 19.12.37.

Equipment Branch

Squadron Leaders.—H. B. S. Ballantyne, to No. 1 R.A.F. Depot, Uxbridge; for Equipment duties, 10.1.38. C. P. Wingfield, to Directorate of Equipment, Air Ministry, 10.1.38.

Flight Lieutenants.—A. M. Reidy, to H.Q., R.A.F., Aden, 8.1.38. W. A. Stagg, to H.M.S. *Glorious*, 4.1.38.

Accountant Branch

Flight Lieutenants.—H. R. Withers, to R.A.F. Station, Worthy Down, 10.1.38. C. L. Dock, to H.Q., R.A.F., Aden, 8.1.38.

Medical Branch

Group Captain.—R. H. Knowles, to H.Q., Bomber Command, Uxbridge; for duty as Deputy Principal Medical Officer, 14.1.38.

Flight Lieutenants.—W. G. S. Roberts, to R.A.F. Station, Leconfield, 13.1.38. J. H. Neal, to H.Q., R.A.F., Iraq, Dhibban, 8.1.38.

Chaplains Branch

Rev. E. C. Jones, to H.Q., R.A.F., Aden, 8.1.38. Rev. J. Lavin, to R.A.F. Station, Cranwell, 30.12.37. Rev. T. M. Jones, B.A., to R.A.F. Station, Halton, 4.1.38.

Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

FOREIGN SERVICE NEWS

Chinese Curtiss Hawks with Wright Cyclone engines and retractable undercarriages. It may be significant that the cockpit enclosures have been removed.

Biplanes in Spain

THE following is extracted from a semi-official Italian source:—

"In that theatre of war (Spain) we have seen dozens of monoplane bombers and pursuit planes of the swiftest and most modern types, brought down by biplanes capable of a speed of more than 50, and in some cases even 100, kilometres less. Once they are engaged in fighting these biplanes succeed, thanks to their extreme manœuvrability and their magnificent climbing qualities, in beating the swiftest enemy who, harassed by attacks, cannot even take refuge in swift flight, and is forced to accept combat under conditions of inferiority, given the lesser manœuvrability of his machine—combat which is almost always fatal to him."

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DOMESTIC SMOKE-SCREENS?

I HAVE recently been following with great attention the letters in your correspondence columns dealing with the defensive screening of cities and valuable targets by means of smoke.

It would almost appear that with the greatly increased speed of modern bombing aircraft it will be practically impossible for defending aircraft to take off and lay an effective smoke screen within the time available, unless, in addition to the regular patrols of intercepting fighters, a permanent patrol of smoke-distributing planes be kept up; obviously a most expensive procedure.

A cheaper and more effective alternative would possibly be to distribute to the civilian population some inexpensive and slow-burning smoke-producing chemical, done up in the form of capsules, to be burnt in the kitchen range. The town to be screened could be divided into various sectors and immediately on receipt of information that a raid was expected instructions could be broadcast, either by wireless or a system of maroon signals, to householders in the windward sectors to put capsules in their ranges at, say, ten-minute intervals until the "all clear" signal was given. In this way a dense, low-hanging pall of smoke could quickly be produced over a large area, with poor dispersing qualities.

As an offset to the various disadvantages of smoke screening, such as the blanketing of the fire of the defending anti-aircraft guns, and the obviously greater loss of life to the civilian population brought about by the indiscriminate dropping of bombs in the hope of finding a target, must be set the much smaller chance of damage to military targets, aiming being impossible; the additional sense of security gained by the individual citizen who feels that because he cannot see the enemy that the enemy cannot see him, and the additional gain to the morale of the civilian population as a whole by making them feel that they are doing their bit. A. J. LELAND.

Sourabaya, Java.

NOT SO SIMPLE

MAY I put forward a simple and practical suggestion which may effectively overcome the handicap of ice formation on wings at little extra expense? That is to run either (a) a proportionately perforated exhaust pipe in the shape of a false leading edge along the wing, when not only will the hot exhaust fumes prevent ice formation, but, also, the deposit of carbon and oil from the exhaust gas will prevent water cohesion to the wing surface; or (b) a continuous exhaust pipe along the leading edge. READER.

Rangoon.

ARTILLERY OBSERVATION IN THE BEGINNING

WHILST agreeing in much of what "Artobs" says (*Flight*, December 30), may I in my turn correct his early history? The "older method" was not, as he supposes, pilot and passenger-observer, but pilot-observer working, as a matter of fact, alone in a B.E.2A with a wireless set which weighed over 70 lb. and a revolver. As one who practised this, having been trained by one of the two original exponents, I claim both apostolic succession and correct historical knowledge.

The first time that wireless was used for artillery work at all, and the first time that aircraft were used by the British Army in war, was on the Aisne in late September, 1914. The R.F.C. possessed two wireless aeroplanes only, manned by two sapper pilots, Lewis and James, to whom the credit for the institution of successful artillery observation from the air belongs. They worked alone in their aeroplanes.

Later, when more sets had been bought and the Army had moved to Flanders, it was discovered that the low-powered aeroplanes of that day could hardly stagger out of the aerodromes—which were small and water-logged—with a pilot, passenger and set. To avoid the difficulty of getting other pilots to work alone, Lucas lamp signalling from air to ground was tried and found wanting. As the battery with which I was then serving did a successful shoot with James working solo, and failed with two people in an aeroplane working by Lucas lamp, I can testify.

There was, unfortunately, a theory that one had to be a superman to combine the functions of pilot, observer and telegraphist. It sustained, but surprisingly and unfortunately survived, a severe shock, when I returned to the front as a young pilot in mid-May, 1915, was posted to James' flight in No. 6 Squadron, and established myself within a fortnight as pilot-observer working alone in a B.E.2A. The C.F.S. had told me it would take me two years.

When the enemy began to mount machine guns in aeroplanes I took up in a B.E.2C a Lewis gun and someone to work it, instead of a revolver; but I continued to do observer-telegraphist myself, as when I had been alone.

I agree with "Artobs" that the system is inherently sounder. I would as soon let another pilot fly my machine while I did artillery observation from the air, as I would allow my battery commander's assistant to hold my field glasses to my eyes when I did it from the ground, and for the same reason. I think that Von Richthofen and his circus increased the efficiency of R.F.C. artillery work by forcing the abandonment of the inefficient passenger-observer system which, although younger, was more usual in 1915 and a great part of 1916.

I do not know if there are any older surviving pilot-observers than I. James was killed as a flight commander doing artillery work alone in my B.E.2A in July, 1915. Lewis was killed doing it as a wing commander with a passenger-gunner in early 1916, both by Archie. Most of the other early ones were killed. But out of respect for the memory of these two officers who got the best solution from the outset, I feel bound to correct "Artobs" and sign myself

Switzerland. EARLIER ARTOBS.

INTERNAL AIR ROUTES

MAY we congratulate you on your excellent plan of the internal routes suggested by Mr. Ashley Hall, which appeared in your issue of January 27?

We would point out, however, Mr. Ashley Hall also recommended a direct route to the Orkneys from Aberdeen.

If you look at the copy of his paper, issued by the Aerodrome Owners' Association, you will find the lines suggested were Aberdeen to Inverness and Aberdeen/Inverness to Northern Islands, which we assume to mean a line from either.

Aberdeen. ERIC L. GANDAR DOWER,
Allied Airways (Gandar Dower), Ltd.

IMPERIAL STRATEGY

MUSSOLINI awakened the Admiralty, Air Ministry and others to the efficacy of Air Power. The aftermath of that awakening has been "loss of face" and loss of friendship. When British battleships tucked their tails between their legs and quitted the Mediterranean for the Atlantic the Admiralty acknowledged that Sea Power, the Power that had built the Empire, was no longer decisive. The battleship cannot now live unless protected by airplanes. Our sea communications, on which the stomachs of residents in this little island depend, are in like case. We *may* be able to balloon-barrage London, etc., but all passive obstacles are, in war, futile unless themselves actively defended. Air Power can blind a ship in a blanket of smoke, with or without lethal gas, and destroy it at leisure. Probably it can do the same with towns, although there smoke may be unnecessary. Both in Spain and in China anti-aircraft guns have been liberally used, yet, time after time, newspaper reports tell us of considerable damage to life and property, even of the machine-gunning of streets, by aircraft that, although fired on by appropriate weapons, suffered no casualties. Only by Air Power can Air Power be dealt with.

Japan makes no secret of her intention to bring under her control the great natural resources and the 400,000,000 hard-working population of China. Will she stop at that? Her own population, voluntarily segregated in her islands for a couple of centuries, is homogeneous, brave, enterprising and industrially so efficient that in all neutral markets her goods oust those of Europe. With trading and shipping interests in China, with great responsibilities in Burma, a vassal of China, in Malaya, in India, Australia, New Zealand, can Britain afford to believe that Japan, when she shall have become the greatest Power in the world, will drop the role of conqueror? And if Britain has to make war in the East can she risk it that her communications will not be cut in the Mediterranean by a Power futilely alienated?

Sir Thomas Inskip recently informed the world that England's rearmament industry will attain its highest momentum about June, 1939. Information broadcast by individuals in responsible positions is intended for foreign consumption. Dates need not be accurate. A disturbing item disclosed at the same time was that although material had been enormously increased, there had been only a negligible addition to

the personnel of the three Services. A land soldier can be trained to efficiency in days, a seaman in weeks, but an airman in a year. It is very bad economy to entrust machines costing thousands of pounds to inefficient hands. Not only must we, on the outbreak of war, have sufficient pilots to take charge of the enormous number of aircraft that our insular position and our imperial commitments require, but, also, we must have a huge reserve in training. Industry could provide aircraft, as it does motor cars, at thousands a week. The R.A.F. can't turn out efficient pilots at that rate. Casualties will, at the beginning, be very heavy, and nerves will "crack." In connection with a reserve of pilots it seems injudicious to discourage flying by youths. Every child whose parents keep a car and whose legs are long enough to reach the pedals learns to drive, even if it is only out of the garage. Every child whose parents have an airplane and whose legs are long enough to reach the rudder bar learns to fly. Youth learns easily such things as riding, cycling, flying. Facilities at public and secondary schools are needed, and if competent instructors think a boy, regardless of his age, capable of handling a machine alone, he should be allowed to. Without the Navy our Army is useless, without the airplane our Navy is useless. Without the pilots our airplanes are useless. In war, if it comes, we'll need 100,000 pilots, and Air Force pilots are not made in a week.

A. J. RICHARDSON.

Uttoxeter.

IN BRIEF

Among old-timers in aviation there must be more than one who, in pre-war days, indulged in adventure in another sphere—that of competing in the T.T. motor cycle races in the Isle of Man. A reunion dinner for such competitors, entrants and others who had a close connection with the races is being held in London early next month, and Mr. H. L. Buckley, 87, Victoria Street, London, S.W.1, asks those interested to communicate with him.

AMELIA EARHART'S STORY

"Last Flight," by Amelia Earhart; 9s., George G. Harrap and Co., Ltd., 182, High Holborn, London, W.C.1.

IN this book the late Mrs. Putnam—or, as she preferred to be known, Miss Amelia Earhart—tells the story of the round-the-world flight which ended in tragedy for herself and her navigator, Frank Noonan.

Thus the book almost achieves the impossible state of being a posthumous autobiography. The explanation is that Miss Earhart was under pledge to send home despatches promptly by cable, telephone, or letter from each stopping-place. This she did with typical conscientiousness, with the result that her husband, George Palmer Putnam, was able to weave them into this very readable account, which follows the adventure up to the moment when, on July 2, 1937, she was about to take her Lockheed Electra off from New Guinea to forge the last link in the girdle by returning from the west to Oakland, California, which she had left, flying east, little more than a month before.

With sinister suddenness the account terminates. The Electra, it will be remembered, was headed out over the Pacific for the tiny spot that is Howland Island. It was never sighted or heard again, and the vast search that was subsequently organised, in which the aircraft carrier *Lexington* scoured 100,000 square miles of sea, revived afresh the question: "Is it fair that ocean fliers should put would-be rescuers under a moral obligation to spend time and money and even to endanger their own lives?"

In the first chapters of the book Miss Earhart describes her earliest flying experience, and then the realisation of an ambition when, in 1928, she accompanied Stultz and Gordon on a west to east crossing of the North Atlantic in the Fokker seaplane, *Friendship*. In 1932 she flew the Atlantic solo in her Lockheed Vega.

These and other ocean crossings are described. She was a graphic writer and, though the initiated may notice a certain lack of technical detail, she had a pleasing way of jotting down trifling things which help the reader into the spirit of the time and place. One of the most telling pasages of all is the unadorned transcription from her log of the California-Honolulu flight (this was to have been the first hop in a westerly globe-circling flight, but it ended in a take-off crash in Honolulu; her subsequent and fatal world flight was made in an easterly direction):—

> "The ship now flies like an aeroplane with almost 2000 lbs. rt. up.
>
> 180 m.p.h. Boy, oh, Boy, I hope the navigators know what they're talking about.
>
> KFI just reported at 12.15 PST weather report from steamer *Monterey*. Also W. T. Miller. Paul called Burbank on 3105.
>
> Noonan asks to hold her steady while he takes string of sights. Pan-Am. in Oa Pan-Am. says to contact Honolulu now 1 a.m.
>
> Harry has just talked with Hon. The moon has sunk into a bed of clouds. We are now using the Sperry to save our eyes, as there is practically no horizon. Just the type of cloud formation and lack of vis. I had last time; only then I had no Sperry little helper.
>
> Clouds are getting fuzzy I think. For a while they were like mere firm white dumplings just under our wings. Then they ran downhill and lay swallowed in the moonlight several thousand feet below. Now they are more formless. However, stars still above.
>
> The navigators are having coffee. I smell it.
>
> The night is clearer now. The clouds are white with dark islands—where the sea shows through.
>
> It is now 4.10 PST. We have been flying over a stretch of open sea, so the sky looks light. Now we reach some clouds with holes in them. Now and then a star seems to rise from one of these holes. Curious illusion."

The major portion of the book—the account of the world flight—lacks such intimate touches as this, but, nevertheless, it does convey vividly the idea of a procession of countries—South America, Africa, India, Java, Australia—expected, sighted, paused in, passed, just as we less adventurous mortals might thread the counties between London and Edinburgh in a Moth on a fine summer's day.

New Zealand Bid Fails

ON Sunday, February 6, at 4.02 a.m., F/O. A. E. Clouston and Mr. Victor Ricketts took-off from Gravesend bound for New Zealand, in the now famous De Havillan1 Comet which already has many successes to its several names.

Clouston and Ricketts were hoping to make the round trip of 25,000 miles journey to New Zealand within twelve days.

Late on Sunday night, after a rather puzzling silence, news was received of a first landing at 3 p.m., G.M.T., at Adana, Syria, 120 miles short of Aleppo, the intended first stop. Petrol had run short due to strong head winds, and 2,000 miles had been covered in 11 hours, an average of 182 m.p.h.

Later came news that Adana aerodrome was flooded, and that a take-off was impossible. Some hours afterwards it was announced that the attempt had been abandoned. Further bad luck was experienced on Tuesday, when the Comet, returning, was damaged during a landing in Cyprus with a flat tyre. Clouston and Ricketts are returning by steamer.

Under the name of *Grosvenor House*, the Comet set up the still current England to Australia record of 2 days 23 hours in the hands of Mr. C. W. A. Scott and the late T. Campbell Black. It was then powered by Gipsy Six R engines. Recently rebuilt by Essex Aero, Ltd., for the Damascus Race (for which it was named *The Orphan*) and F/O. Clouston's recent Cape record (*Burberry*), it now has two 205 h.p. Series II Gipsy Sixes and, of course, v.p airscrews.

Ricketts and Clouston at the start of their ambitious record attempt, doomed to failure by that most aggravating of all obstacles—a flooded aerodrome.

PRIVATE FLYING

ATTRACTIVE HIGH-WING: The latest Wicko, with Gipsy Major engine. It carries two at a cruising speed of 120 m.p.h. (136 m.p.h. maximum), and has a range of 500 miles. The makers are the Foster, Wikner Aircraft Co., Ltd., Southampton Airport.

"Flight" photograph

Topics of the Day

Still Approaching

WHEN, in last week's comments, I spoke about making a right-angle approach, it suddenly occurred to me that this was certainly not the way in which we were taught to deal with the matter ten years ago or so.

In those days any tendency to overshoot was corrected by means of a series of S-turns, using a sideslip to kill the last hundred feet or so. In other words, every aerodrome was approached as if it was the one and only open space within the cruising range of the machine and as if the engine would function correctly only until the moment when the throttle was closed to come in. Every landing was a forced landing, and to some extent this must still hold good for all single-engined machines.

The present interest in approach difficulties has at least been partly caused by the crowded nature of the air in the vicinity of the majority of aerodromes, with the characteristics of the latest type of aeroplane as a contributory difficulty. The number of machines which are making landing circuits nowadays at every aerodrome causes anything in the nature of an S-turn to be *verboten*; very few monoplanes can be effectively sideslipped and the result is that an accurate engineless approach has become a comparatively difficult matter.

Consequently, too, we very rarely have a chance of practising a genuine forced landing approach and are doubtful, in fact, whether this could be carried out accurately more than three times out of four. The probability is that if it really came to the point, and the whole sky was available for use, we should get very hot and bothered, but the forced landing would be pulled off with the help, perhaps, of a series of strange manœuvres such as variation of the flat turn, leaving the flaps to take the place of the erstwhile sideslip in order to get rid of that little bit of extra height which should always be kept in hand.

Stylism

THE fact is that most of us are unreasonably and perhaps unnecessarily proud about the style of an aerodrome approach. Quite wrongly we imagine that a score of critical people are watching from the tarmac and that any motoring will be looked on with severe disfavour. Not very long ago I dropped a machine from about five feet, luckily without doing any damage, and afterwards crept up to the club buildings with a face of a ripe tomato colour. Only one person had seen the performance, and he had only done so by accident since he was the pilot of a machine which had been parked in the middle of the aerodrome waiting for me to come in. He was, consequently, the only person who had the slightest interest in my machine.

Nevertheless, I think that this pride is, on the whole, a good thing, since it forces at least the less consciously perfect pilots to concentrate really hard on making a clean and tidy approach right on to the very spot which, while being safe enough in case it is necessary to go off again, prevents the necessity of a lot of taxying. For some reason or other very few amateur pilots, once they have put in a reasonable number of hours and are no longer watched and tested by an instructor, trouble to find a good large field and practise forced landings. It is, consequently, only during aerodrome approaches that such practice can be obtained.

An indirect result seems to have been the development of the right-angle approach technique previously mentioned. This has its advantages, though it does not permit quite the same margin of error as in the case of the old-fashioned forced-landing methods. However, the boundary of the aerodrome or field can, with the new technique, be watched the whole time without interruption, whereas in the course of a few S-turns this boundary is out of sight for quite a few seconds, during which the wind may drift the machine just too far away from the field. No moment can be more horrifying than that in which undershooting is first suspected when there really is no engine on which to depend.

Forced-landing Safety

WHILE the virtues of the Hammond were first being demonstrated to me at Schiphol, the pilot actually undershot the beginning of the runway by a matter, perhaps, of five yards. It was rather late in the day for attempting to reduce the flap area and he did not use the motor. He simply let the machine fly straight into the rough ground in between two boundary boards and the tricycle undercarriage, with its exceptionally long movement of travel, did the rest. Any normal machine might have turned over and would certainly have bounced badly enough to strain the structure.

To some extent, therefore, the tricycle arrangement, provided that the front wheel fittings are sufficiently robust, should reduce the dangers involved in a misjudged forced-landing approach. If there is a hedge in the way, of course, one can only plough through it and hope for the best, but here, again, I think this arrangement would give one a better chance. Certainly the pilot who is accustomed to the use of tricycle gear would not be so liable to attempt to hold the nose up in an endeavour to get over the obstacle at all costs—a tendency which always results in increased damage, as the approach angle of a stalled glide is a good deal steeper than one made normally. There is always the possibility, too, that the machine will be fully and finally stalled at the last moment, with the inevitable nose-in.

All of which is about as cheerful as a day at the morgue, but I rather believe in preparing for the worst and even in talking about it if by so doing ideas may be clarified and the worst made, consequently, a little less bad. Surprisingly enough, people seem very rarely to be hurt in botched forced landings. Sheer horizontal velocity can spread a

(*Concluded on page* 147.)

FROM the CLUBS and SCHOOLS

Flying Times : Membership : Licences : Parties

LONDON

THE flying time for last week was 28 hr. 20 min., and new members joining included Messrs. E. L. Forsberg and C. H. Hallner.

HAMPSHIRE

The total flying for January reached 138 hr. 5 min., and for the week ended February 5, 38 hr. 40 min.

STRATHTAY

For the week ended January 31, 31 hours' flying was recorded, bringing the total for the month up to 39 hours, which, considering the time of year, the weather, and two completely blank week-ends, was not so bad.

YORKSHIRE

Although Yorkshire experiences every possible British weather extreme, the club still maintains a good flying average and during January achieved a 100 per cent. increase over the previous January. New members include Messrs. G. Jefferson and M. P. S. Kendall, of the A.A.F.

BARTON (BEDS)

The decorations and furnishing of the clubhouse should be finished by the end of the week and the first meal (tea) will be served in it on Sunday next. Bedford was unusually fortunate in enjoying excellent weather for flying last week. A new member is Mr. S. W. Cooper.

PENANG

A landing competition was held recently and resulted in a win for Mr. T. F. McGowan. Nine pilots competed. The usual cross-country flights were carried out and 116 hr. 45 min. flying was recorded. Mr. Mohamed made his first solo flight and also passed his tests for the Straits Settlements "A" licence.

NEWCASTLE

A tramp party is being held in the clubhouse on Friday, February 25, whilst a flying competition is being arranged for the Chairman's Cup, commencing Sunday, February 13. Unsuitable weather rather curtailed flying on three days and 22 hr. 35 min., composed chiefly of solo, was logged. Mr. L. S. Avison is a new member.

C.A.S.C.

Last week-end, which was the first on which members had shared the Cambridge Aerodrome with the newly formed R.A.F. Volunteer Reserve Training School, members flew 7 hr. 55 min. Mr. P. W. Roberson, late C.O. of the No. 3 (Cambridge) Squadron of the Corps, has now transferred to the Reserve School. Mr. H. Sali was passed out for passenger carrying.

HANWORTH

The first dawn patrol of the season will be held at the London Air Park on Sunday, March 6, between 8.15 and 9 a.m. A landing competition will be held at Aldenham Aerodrome on Sunday, February 20, at 12 noon. Mr. Platts has completed his "A" licence tests and Miss E. Ford is a newcomer. The total flying for the week ended February 5 was 37 hr. 25 min.

RAND

During December the Rand Club's flying time at the Rand airport, Potchefstroom and Benoni, totalled 339 hr. 15 min. Nine members of the associated gliding club have recently been at the Capetown Rally, but "C" licences have been obtained by Messrs. J. R. Ivy and G. Peirce, and "B" licences by Messrs. D. Marillier and E. Dommisse.

SOUTHEND

An increase of over 30 per cent. was shown in the flying times for January, 1938, over those of January, 1937. For the week ended February 6 over 35 hours were logged.

LIVERPOOL

The annual ball will be held in the Grosvenor Hotel, Chester, on Friday, February 25, 1938. A landing competition was held at Hooton last Saturday. The winner of the senior section was Mr. R. Farrer-James, with Mr. R. K. Rathbone second; in the junior section, Mr. Desmond Boxwell was first and Mr. J. S. Boumphrey second. Flying for January amounted to 95 hr. 30 min., although high winds proved rather overwhelming on some days. Several cross-country flights were also made.

NORFOLK AND NORWICH

The arrangements for this year's Public Schools' Aviation Camp are going ahead, and the camp will be held in August and September. Out of the sixty boys who have to date attended this camp only two have failed to obtain their "A" licences. The annual dinner of the club has been fixed for Friday, March 25, and will be held in the clubhouse. A dance, run by the house committee, will wind up the proceedings. In the gliding section much activity is stirring, and Mr. E. M. Hick, of North Walsham, is one of the first to obtain his "B" gliding licence.

CINQUE PORTS

A visitor in an interesting machine was Mr. Wynne-Eaton in the production C.W. Cygnet. Several members were privileged to fly it. Capt. E. W. Percival also dropped in on his way home from Amsterdam. First solos were made by Mrs. Bagshawe, Mr. Chambers and Mrs. Bryant. Mrs. Bagshawe has since completed her "A" licence tests successfully. The total flying for the week showed an improvement with the weather and amounted to 55 hours. Mr. J. K. Robertson, who is taking his "B" licence, has completed his Henlon tests and is waiting for a fine night for the night flight.

BROOKLANDS

Over 200 club members came to see last Sunday's display of aerobatics by the chief instructor, Mr. K. H. Waller. This took the form of a "pupil and instructor" act with Capt. Davis and Mr. Douglas Watson doing their pieces on the ground with the microphone. In spite of a misty horizon and the fact that Mr. Waller was suffering from a mild attack of influenza, the display was everything that it should be. A handicap landing competition will be held next Sunday. Mr. Livingstone has passed his "B" licence tests and Messrs. Fuller, Turtle, Jones, Macpherson, Horsfield and Terry Miles made their first solo flights. A total of 104 hours was logged for the week's flying.

LEICESTERSHIRE

Thanks to rather unsympathetic weather only 34 hr. 35 min. were spent in the air during January, but ten cross-countries were made. An exceptionally amusing New Year dance held on January 28 paid off the outstanding balance for the badminton and hard tennis courts. At a recent meeting the following members were elected to form the committee of management for 1938:—Messrs. W. Lindsay Everard, M.P. (president); T. Trevor Sawday; R. C. Winn (hon. sec.); T. J. Moffatt (hon. treas.); E. A. Underwood; H. Purt; W. F. Price, J.P.; E. S. Harding; S. Brown; J. T. L. Baxter; C. H. Briggs; H. P. Lavender; H. R. H. Ellison; E. C. Kendall; R. C. Johnson; and H. W. Bott. Mr. T. T. Sawday was appointed chairman of this committee, and the following were elected to form the executive committee:—Messrs. T. T. Sawday, T. J. Moffatt, R. C. Winn, S. Brown, E. A. Underwood, E. C. Kendall, and C. H. Briggs.

Forthcoming Events

February 11. D. H. Aeronautical Technical School Annual Dance, Hyde Park Hotel, 9 p.m.

February 17. R.Ae.S. Coventry Branch Lecture: "Aircraft Motive Power," by Major E. F. Green.

February 17. Civil Aviation Service Corps: Annual Dance, First Avenue Restaurant, Holborn, London, W.C.1.

February 21-March 4. British Industries Fair.

February 25. Hampshire Aeroplane Club. Annual Dinner and Dance, South-Western Hotel, Southampton.

February 25. Liverpool and District Aero Club: Annual Ball, Grosvenor Hotel, Chester.

March 3. R.Ae.S. Lecture*: "Riveting Methods in Germany," by Dr.-Ing. W. Pleines.

March 4. Cambridge University Air Squadron: Annual Dinner, University Arms Hotel, Cambridge.

March 10. R.Ae.S. Portsmouth Branch Lecture: "Air Raid Precautions," by Sgt. Barnes.

March 24. R.Ae.S. Portsmouth Branch Lecture: "Refuelling in the Air," by Sir Alan Cobham.

April 7. R.Ae.S. Lecture*: "The Manipulation of the Boundary Layer," by Mr. E. G. Richardson.

April 21. R.Ae.S. Lecture*: "High-altitude Flying," by Prof. J. E. Younger.

April 28. R.Ae.S. Lecture*: "Factors Controlling the Development of Electrical Ignition on Aero Engines" by Dr. G. E. Bairsto.

May 28. Air League of the British Empire: Empire Air Day.

May 28-June 2. Belgrade Aero Show.

June 4-6. Manx Air Races.

June 4-7. Yorkshire Gliding Club: Whitsun Open Meeting, Sutton Bank.

July 17. Brooklands Associated Clubs: Competition and "At Home," Brooklands.

July 17 - August 1. Yorkshire Gliding Club: Open Contest, Sutton Bank.

August 7-21. Yorkshire Gliding Club: Instruction Course, Sutton Bank.

* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1., beginning at 6.30 p.m.

A NEW "FLAT FOUR" FROM AMERICA

Menasco of 50 h.p.

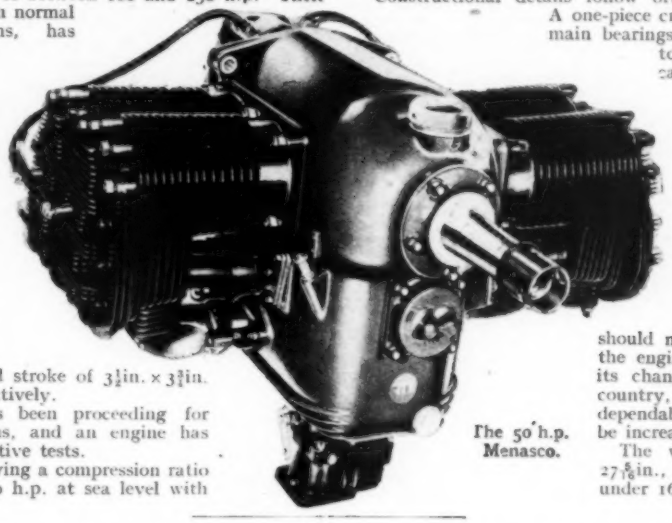
UNTIL recently the Menasco Manufacturing Co., of Los Angeles, California, had confined their efforts to inverted in-line air-cooled engines of between 100 and 250 h.p. Their work in this class, both in normal and supercharged forms, has earned them a wide reputation.

A new Menasco is now being introduced in a class which, in this country at any rate, has suffered some neglect. It is one suitable for the small private-owner types now proving so popular across the Atlantic.

Known as the M.5, it is a 50 h.p. horizontally opposed four-cylinder of 144.4 cu. in. (2,360 c.c.) capacity, having bore and stroke of $3\frac{1}{2}$in. × $3\frac{3}{4}$in. (89 mm. × 95 mm.) respectively.

Development work has been proceeding for more than twelve months, and an engine has recently completed exhaustive tests.

One thousand M-50s having a compression ratio of 5.5 to 1 and giving 50 h.p. at sea level with an engine speed of 2,550 r.p.m. are scheduled for immediate production.



The 50 h.p. Menasco.

Constructional details follow orthodox modern practices. A one-piece crankshaft is carried in two main bearings. Alloy heads are bolted to heavily finned nickel-cast-iron blocks, and the valve gear is enclosed. A wet sump system is used, with gear-type oil pump. The sump holds four quarts and is finned for additional cooling.

The carburettor is an up-draught Stromberg with altitude control, and ignition is by a single Bendix-Scintilla magneto. It should not be difficult to convert the engine for dual ignition, and its chance of popularity in this country, where there is room for a dependable unit of this type, would be increased.

The width of the engine is $27\frac{5}{16}$in., and the weight a little under 160 lb.

Swooping Over the Border

THE "dawn patrol," that sporting type of club event which gets so many enthusiasts up betimes on Sundays and wins breakfasts for the wily ones, is not easily staged anywhere and everywhere.

Up north, for example, the Border Flying Club finds that the cold, cold dawn business would have to be greatly overdone, for the nearest "neighbouring" aerodrome to Carlisle is some fifty miles distant, and the other few are a hundred miles or more away.

Thus they have hit on the idea of what, falling back to the history book, they call a "border raid." On Sunday, March 6, raiders from the Scottish clubs—Scottish, Edinburgh and Strathtay—will try to reach Carlisle unobserved by way of four valleys, those of Glenkens, Sanquhar, Liddesdale and Moffatt. Carlisle's defence will be assisted by the Newcastle Club. The war will take place between 11.30 and 12, and lunch will be early enough to allow the warriors to return to their own camps for the usual busy Sunday afternoon's flying.

All of which sounds very entertaining—provided it does not involve "flying in formation with a train, a car and a tug," to quote a pilot of our acquaintance who once found clouds forcing him lower and lower into some horrid Pennine (or maybe Mendip) cleft.

An alternative suggestion, of course, and one in which the Air Ministry might be persuaded to co-operate, would be a balloon barrage across the end of each valley.

Handbook for Newcomers

"How to Become a Pilot," by Captain R. L. Preston; 3s. 6d.; Sampson Low, Marston and Co., Ltd.

JUDGING from the number of enquiries which are received by various clubs, and, for that matter, by ourselves, from young people and others who want to learn to fly but have not the least idea how to set about it, there should always be room for books which answer all such questions for the prospective pilot or owner. Originally published nine years ago, *How to Become an Air Pilot* has now been revised once again and carries a fair amount of new information.

All the details of licences and examinations are clearly given and there is a list of clubs and schools which is at least as up to date as any other. Something like ninety pages are devoted to test answers to typical questions in the technical examination and here the book overlaps another excellent one, which has also been in circulation for a large number of years—that by John Leeming covering the "A" licence syllabus. In the section devoted to the buying of an aeroplane the position of the second-hand machine, in comparison, for instance, with a second-hand car, is satisfactorily explained.

One of the better similes in the book is that concerning aircraft insurance. The owner is asked to treat the whole matter as if the underwriter had bet him 10 or 15 to 1 that he would not crash his machine during the year. If all motorists thought of insurance in this way there would not be quite so much of the "that's all right, I am insured" kind of motoring.

Topics of the Day

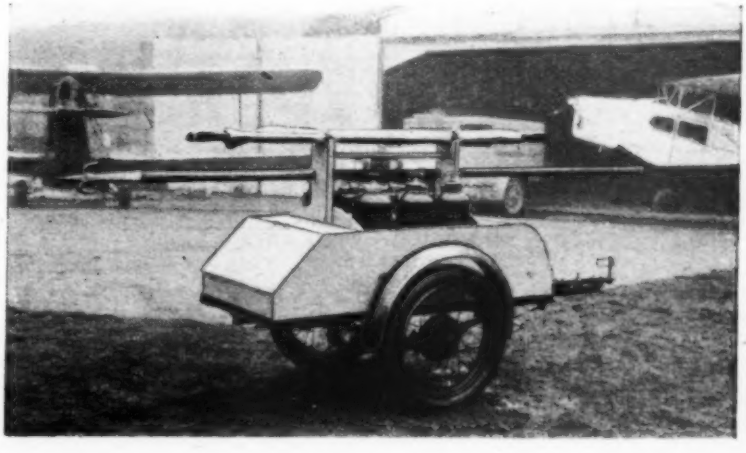
(*Continued from page* 145)

machine over the local landscape, but the spreading motion has the effect of reducing the rate of deceleration.

Any thought on the development of ideas which will reduce the possibility of minor but expensive accidents must, for the sake of aviation as a whole, be given due prominence. Always remembering that, as far as the daily Press is concerned, a perfectly successful forced landing is a crash within the meaning of the act.

INDICATOR.

FOR THE CLUBS: Something light and inexpensive in the way of crash equipment for towing behind a car. Fitted with L. and G. foam equipment, rescue hook, etc., it is handled by the Lindsay-Neal Aviation Co., 7-8, Norfolk Street, London, W.C.2.



THE INDUSTRY

"Enquire Within"

ONE of the most comprehensive catalogues we have ever encountered has been issued by R. K. Dundas, Ltd., of the Airport, Portsmouth, and New Delhi, India.

It covers almost every imaginable article of aeronautical equipment, from complete aircraft and engines, by way of radio transmitters and equipment, down to the smallest A.G.S. parts.

Wakefield Appointments

MR. A. LIMB, manager of the aviation and motor department of C. C. Wakefield and Co., Ltd., is among four members of that organisation recently appointed to the board. The others are: Messrs. H. V. Blades (manager, purchasing department), C. D. Sandison (manager, overseas branches department) and W. H. Senneck (assistant secretary).

News and Views at D.H. Meeting

"THE biggest year in the company's history" was dealt with by Mr. A. S Butler (chairman) at the De Havilland annual general meeting last week.

Some points from Mr. Butler's speech were:—

A £100,000 increase in "plant and machinery" had gone almost entirely towards the more modern equipment of the v.p. airscrew and Gipsy engine factories.

In spite of their Government work, the company produced nine different aircraft types, mostly civil, last year.

Production of the Albatross had been brought forward concurrently with the testing of the prototype, and the large erecting shop was now fitted with a batch of these machines for Imperial Airways.

After some thousands of hours of bench and flight testing, the first Gipsy Twelve engines were now being fitted in the Albatross and the Don trainer.

Production of v.p. airscrews had started in the "shadow" factory at Bolton, Lancs.

A contribution amounting to £8,000 per annum was being made by the company to the employees' holidays-with-pay fund.

The net profit for the year was £122,185, as compared with £71,709 for the previous year. A 10 per cent. dividend, with 2½ per cent. bonus, was recommended.

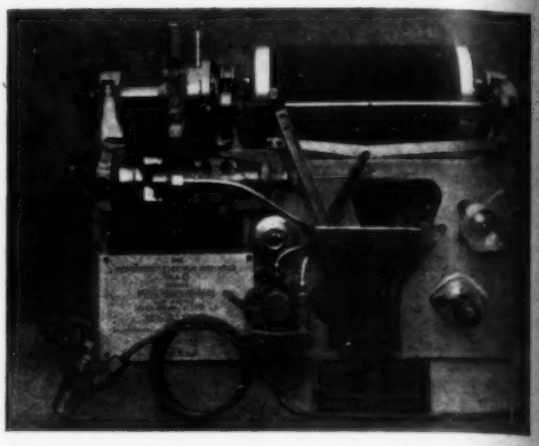
Mr. Butler concluded with some particularly trenchant observations. He said:

"Civil aviation has been, as you know, the focus of this company's hopes and efforts since 1920, and I feel that our policy has been fully justified in following this course, but in many respects I must say the future gives cause for a certain amount of anxiety. The outcome of the policy of striving to make civil aviation 'fly by itself' in this country has restricted technical progress within the industry. Other countries, supported by grants and subsidies out of public funds, have stepped confidently ahead and with formidable success in both civil and military fields. For instance, the total sums voted for civil aviation for the United States and Great Britain in accordance with the official reports for the five years 1932 to 1936 were £30,733,000, against £3,023,000, making an average annual expenditure during these years of over £6,000,000 for the United States against £600,000 for this country—one-tenth. I think these figures speak for themselves.

"Imperial Airways have made remarkable progress within the policy laid down, but there is no doubt that throughout the Empire the minimum of encouragement has been given to air transportation. It was therefore with great satisfaction that your directors observed the appointment of the Cadman Committee, for nothing but good should come from a thorough ventilation of the facts, and its findings are awaited with interest.

"A vigorous system of air transportation will not only open avenues for the further development of our overseas trade and contracts abroad, enable our aircraft industry to meet competition in foreign markets, but also promote the air strength of the Empire. The eminence of the Empire in the air must surely be achieved if we are to compare with our former maritime supremacy, both as regards construction and operation. With the experience of the past few years before us, however, I do not think I exaggerate when I say that if this policy of striving to make British civil aviation 'fly by itself' continues, the world will purchase its aircraft elsewhere.

"I am confident that new types now in the process of evolution in all branches of our business should, with the assistance of a more enlightened view by our Government, enable this company to hold its own against international and subsidised competition."



INGENIOUS: This somewhat mysterious-looking apparatus is the Dobbie McInnes "Farnboro'" electric indicator for obtaining diagrams of the pressure variations in the cylinders of aero and other engines. It can be used on the test-bed or in the air. The indicator (which was described on page 547 of *Flight* for December 2, 1937) is made by Dobbie McInnes, Ltd., 57, Bothwell Street, Glasgow.

NEW COMPANIES.

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

CHARLES LLOYD AND CO., LTD.—Private company, registered January 12. Capital, £500 in £1 shares. Objects: To carry on the business of air surveyors and photographers, makers and general merchants of aeroplanes, general photographers, etc. The subscribers are: Fleckney H. R. Turney and Alfred J. Barsham 1, Ironmonger Lane, London, E.C.2. The first directors are: Chas. Lloyd and F. H. R. Turney.

CHURCHILL COMPONENTS (COVENTRY) LTD. Private company, registered December 30. Capital, £5,000 in 5,000 shares of £1 each. Objects: To carry on business as manufacturers of and dealers in bolts, nuts, screws, nails, plugs, studs and similar goods. The first directors are: Walter M. Churchill, aeronautical engineer; William A. Churchill; Mrs. Hannah V. Churchill; Mark T. Avent. Registered Office: Quinton Road, Coventry.

HAW COMPOSITE AIRSCREWS LTD.—Private company, registered January 24. Capital, £300 in 300 shares of £1 each. Objects: To enter into a deed of licence with Col. Jas. C. Fitzmaurice and Jakob Haw, as licensors, and to carry on the business of mechanical and aeronautical engineers and manufacturers of aircraft of all kinds, etc. The directors are: Col. James C. Fitzmaurice, Jakob Haw, Bentinck Mansions, Bolsover Street, W.1, inventor, and Francis C. J. Butler. Registered office: 14, Gray's Inn Square, London, W.C.1.

BURY ST. EDMUNDS AIRPORT LTD. Private company, Registered January 28. Capital, £2,000 in 2,000 shares of £1 each. Objects: To carry on the business of proprietors and managers of airports or aerodromes in any part of the world etc. The directors are Whitney W. Straight; Owen G. E. Roberts, 17, Manchester Square, London, W.1.

THE BRITISH AIR NAVIGATION CO., LTD. was registered as a private company on January 28, with a nominal capital of £100 in 100 shares of £1 each. The objects are to operate lines of aerial conveyance, to manufacture and deal in aircraft of all kinds, to carry on the business of general carriers, forwarding agents, etc. The directors are: The Rt. Hon. Earl Amherst, (Director of Channel Air Ferries Ltd.); Sydney F. Emanuel. Solicitors: Vandercom, Stanton and Co., 36, Spring Gardens, London, S.W.1.

CHANGES OF NAME

BLACKPOOL AND WEST COAST AIR SERVICES LTD., 10, Smith Square, London, S.W.1.—Name changed to West Coast Air Services, Ltd., on Dec. 6, 1937.

BRITISH MARINE AIRCRAFT LTD., Hamble, Hants.—Name changed to Folland Aircraft Ltd. on Dec. 24, 1937.

AERONAUTICAL PATENT SPECIFICATIONS.

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.):

(*Published February* 3, 1938.)

18618. MARTIN, J.: Safety means for use in preventing or correcting spinning in aircraft (477,844).

18840. MASTER, S. D.: Lifting means for aircraft (477,894).

19033. OVTSCHINNIKOFF, A. Sighting devices for dropping bombs from aircraft (477,699).

19093. PANSTWOWE ZAKLADY TELE-I RADJOTECHNICZNE W. WARSZAWIE: Wireless systems, particularly direction-finding apparatus (477,963).

19182. SPROULE, D. O., HUGHES, A. J., and HUGHES AND SON, LTD., H.: Indicating instruments (477,781).

20399. RUBERY OWEN AND CO., LTD., and ROBINSON, G. H. L.: Seats for motor and other vehicles (477,626).

21811. READ, J. R.: Aircraft cowling (477,627).

22221. HUTH, F.: Propellers for aircraft (477,707).

23902. KABUSHIKI KAISHA JETTOPLANE KOKUKI KENKYUSHO: High-speed rotating screw propellers for aircraft (477,929).

852. MANUFACTURE D'ARMEMENTS ET DE MUNITIONS ARMU SOC. ANON.: Bombs and similar projectiles and percussion fuses therefor (477,733).

5834. NISTRI, U.: Devices for the pneumatic flattening of films in aerophotographic cameras during exposure (477,740).

11682. LORENZ AKT.-GES., C.: Wireless signalling systems for aircraft (477,808).

(*Published February* 10, 1938).

10347. SPERRY GYROSCOPE CO., Inc.: Automatic control of aircraft (477,983).

16087. GARDEN, A. D.: Aircraft wings (478,190).

19448. MARTIN, J.: Fuselages, body parts, or hulls of aircraft (478,307).

25644. REED PROPELLER CO., Inc.: Devices for eliminating torque variations in shaft systems, more particularly for suppressing torsional vibrations in internal-combustion engine crankshafts (478,286).

498. VICKERS (AVIATION) LTD., and WALLIS, B. N.: Construction of aircraft wings (478,089).

22976. SOC. ANON. ALFA ROMEO: Airscrew propellers (478,054).

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